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ABSTRACT

This document includes a detailed presentation of the full administration and operation of PATS (The Physics and Astronomy Teaching Survey) currently used by the Department of Physics and Astronomy at the University of Maryland. This report complements Part I, which gave a general presentation of the problems involved in obtaining such evaluation, and of the types of decisions that must be made by those setting up the evaluation process. Related document is HE 004 531. (Author/MJM)

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AN APPROACH TO OBTAINING STUDENT EVALUATION OF UNIVERSITY TEACHING

PART II - A FULL OPERATING MANUAL

by

Jerry Fram, Claude Kacser,
David Trevvett, and Tom White

TECHNICAL REPORT NO. 72-118

December, 1972

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UNIVERSITY OF MARYLAND
DEPARTMENT OF PHYSICS AND ASTRONOMY
COLLEGE PARK, MARYLAND

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AN APPROACH TO OBTAINING STUDENT EVALUATION OF UNIVERSITY TEACHING

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A detailed presentation of the full administration and operation of PATS - The Physics and Astronomy Teaching Survey - currently used by the Department of Physics and Astronomy, University of Maryland. This report complements Part I, which gave a general presentation of the problems involved in obtaining such evaluations, and of the types of decisions that must be made by those setting up the evaluation process.

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PREFACE - AN OVERVIEW OF PART II OF THIS REPORT

Part I of this report (Technical Report No. 72-117) was subtitled "A General Discussion", and presented the pragmatic answers we decided upon to the "philosophical" questions involved in systematically attempting to obtain student opinion about the teaching to which University students are exposed. Part II is a logical continuation of Part I, in that it presents the detailed procedures that were developed and are presently used within the Department of Physics & Astronomy. (These procedures have been given the acronym PATS -- for Physics & Astronomy Teaching Survey.)

Structurally Part II is written as a detailed administrative and operating manual for PATS. This is divided into three separate parts; it is likely that these three parts will be under the supervision of three separate individuals, and to a major extent the three parts are independent and can be read separately. Chapter 3* is directed to the overall administration of the questionnaires, up to the stage of converting the responses into "Digitek" computer readable IBM cards. Chapter 3 also discusses certain aspects of the preparation for the computer runs of the programs DATAREAD, INITPRT and AGGFORM; and finally, it discusses the distribution process for the results of the computer analysis and sundry other administrative matters. Chapter 4 discusses the first stage of the computer analysis of the Digitek cards, which uses the computer programs DATAREAD and INITPRT (initial print). Chapter 5 discusses the computer program AGGFORM (aggregate formation) which implements the philosophy given in Part I. Chapter 5 is intended for the person who will interface with the computer and is really an AGGFORM execution manual. Since this person must be given instructions by the person in charge of overall administration, therefore such instructions are discussed in Chapter 3. However, for simplicity a brief review of these relevant ideas are given in Chapter 5 so that Chapter 5 remains self-contained.

There are also numerous appendices.

For the reader's information, we repeat in the following pages the PREFACE from PART I of this report, as well as the updated and amplified ACKNOWLEDGEMENTS.

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* We continue the Chapter numbers and pagination from Part I. Appendices in Part II are given letter identifiers.

PREFACE - AN OVERVIEW OF THIS REPORT[†]

This report is addressed to the problems of how systematically to obtain student opinion about the teaching to which such students are exposed in a University setting. Nowhere do we consider the very important matter of how to interpret such "uneducated" opinion.[*] We call such opinion "student evaluation of teaching" without any implied judgment concerning the validity of this student evaluation.

This report specifically describes the procedures presently used by the Department of Physics and Astronomy. (These procedures have been given the acronym PATS - for Physics and Astronomy Teaching Survey.) In order to develop PATS, many general problems had to be addressed and decisions made. In particular it was found that "purely technical" questions were inescapably intertwined with "philosophical" questions, and many such philosophical questions had to be asked and answered before one could fully implement PATS. Such questions must always arise in any attempt to obtain student evaluation of teaching. The danger is that certain administrative type decisions on "technical questions" may be made without full realization that they have philosophical import.

It follows that this report must address itself both to general questions relating to all such student evaluation procedures, and to the specific procedures used in PATS. We hence decided to write this report in two separate parts, separately bound. Part I deals primarily with general questions, and should be of interest to anyone who is attempting to set up a student evaluation procedure. Part II is primarily an operating manual for PATS in its present form. It would be of interest to someone who is charged with the actual implementation of such a similar procedure, since he must deal with all the technical questions. But our hope is that all general type questions are raised and discussed in Part I. These are the types of question which would need to be considered, for instance, by a faculty committee overseeing the implementation of such a procedure.

The two parts of this report are so written that each may be read on its own. Hence it has been necessary to duplicate certain material. Structurally Part II is the continuation of Part I, and the two parts together form the complete report.

We have organized the report as follows: Part I consists of Chapter 1 and 2 and related appendices. Chapter 1 provides a general overview of PATS, from the nature of the questionnaires to a brief description of the way in which the responses are processed and the results made public. A summary of the entire process is given in the final section of this chapter. Chapter 2 considers some of the problems and decisions involved in such a project, such as how one goes about combining the results of different

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[*] But is it any more uneducated then most other forms of teaching evaluation?

[†] This preface also appears in Part I.

sections.[*] This chapter explains how these questions were resolved for PATS, some of them being decisions of taste or convenience, with little compelling force behind them. Since most of the "philosophical" problems are connected with combining the results of different sections, this chapter is principally a discussion of procedures used in the computer program AGGFORM.[**] A number of concepts and definitions are introduced in this chapter.

Part II of the report consists basically of "how to" manuals for the actual execution of the various aspects of PATS. Chapter 3 discusses overall administration and supervision. Chapter 4 treats the preparation of data for and execution of DATAREAD and INITPRT. Finally, Chapter 5 similarly discusses the preparation of data for, and execution of, AGGFORM. (There are also numerous appendices.) We have attempted to make these three chapters and related appendices each complete enough in itself so that, for example, different individuals could be responsible for different phases of the survey, and each would only have to read the one chapter relevant to his phase. Since various concepts and definitions are introduced in this report as needed, and a particular chapter may assume that the reader has already learned a particular term, such definitions have been collected in a Glossary for the convenience of those using, say just one chapter of the report. In some cases the Glossary contains illustrative examples not found in the main text. This Glossary is attached to the report as an Appendix which appears in Part II.[†]

While PATS is an "official" survey procedure as presently implemented by the Department of Physics and Astronomy, it must be emphasized that this report is the work of four individuals; they were all deeply involved in setting up PATS, and hence they (particularly Dr. Claude Kacser) were forced to make many "philosophical" decisions as they arose during the task of technical development. This report discusses these decisions. It follows that all such discussion should definitely not be construed as representing the "view of the Department of Physics and Astronomy," but solely as representing the views of the four individual authors.

PATS is an ongoing operation. Hence it is continually being modified, updated, and hopefully improved. At any given stage, some minor errors exist. It has not seemed worthwhile to attempt to correct all of them in this present report. Thus questionnaire 3 contains some unfortunate "typographical" errors, which will be corrected in the next run. But such errors hopefully should not detract from the overall value of this report. For similar reasons, we include unedited internal department memos.

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[*] We consistently use the term "section" to denote the smallest basic unit of teaching exposure to one instructor, whether this refers to lecture, recitation or lab; faculty or graduate T/A; and whether one section of a many section course, or one distinct course.

[**] DATAREAD, INITPRT, and AGGFORM are the names of three separate electronic computer programs that are used by PATS at various stages.

[†] As actually written, Part II does not contain such a complete glossary. A partial glossary appears in section 5.2, p. 5.1, and other concepts are discussed in Ch. 3.

ACKNOWLEDGEMENTS [†]

This report presents the work of many people, performed over a long period of time, with the scope expanding as experience was gained. The Department prepared its first trial questionnaire in Spring 1970, using a version mainly written by Dr. P. DiLavore, and for which responses had to be read individually. In Fall 1970 a committee chaired by Dr. Daniel Fivel prepared a short questionnaire which was used in most classes, and for which the responses were processed by electronic computer. Programming for this was performed by Charles Katz and Jerry Fram.

In light of these experiences, considerable changes were made and the present set of questionnaires and processing methods developed. These were first used in Spring 1971, and with minor revisions have again been used in Summer 1971 and Fall 1971. At this point it seems worthwhile to make available in written form details of the present questionnaire and processing.

The set of present questionnaires was developed by a committee chaired by Dr. William Hornyak. A major contribution to this work was made by Jearl Walker. The questionnaires were typed up through many versions and corrections by Mrs. Marie Daston. The computer programs DATAREAD and INITPRT were developed by Tom White. The computer program AGGFORM was developed by Jerry Fram and David Trevvett. Dr. Claude Kacser has supervised most of the general aspects of preparation of the questionnaires, distribution and collection of questionnaires and answer sheets, data processing, development of computer programs and format of output, and distribution of results. In these administrative tasks, Dr. Thurston Griggs dealt with many of the trivial but crucial administrative details of implementation, actual distribution and collection of questionnaires and answer sheets, distribution of output, etc. Without his efforts, the actual survey results would not have existed.

In Fall 1971 Dr. George Snow prepared one new questionnaire, and made various minor changes in the others in light of previous experience. At that time he took over part of the supervisory job from Dr. Kacser. Dr. Bruce Barnett also became actively involved for Spring 1972. He has had complete supervisory responsibility since Summer 1972, assisted by Dr. Griggs and a graduate student programmer Mr. Carter Armstrong.

This report (Parts I and II) has been written by Claude Kacser and David Trevvett, with assistance in a few places from Tom White and Jerry Fram. Specifically, Chapters 2 and 5 are the primary work of Trevvett, Chapters 3 and 4 are the work of Kacser, (White wrote Section 4.3) and Chapter 1 and the Appendices were a joint product, with one writing some sections and the other writing the rest. Most of Chapters 1, 2, 3, and 5 were read, discussed, and corrected by both authors, as were most of the Appendices; and Chapter 4 was checked by both White and Kacser. In cases of disagreement, Kacser made all the final decisions. Documentation of such a project as this is a difficult task, and presumedly there are some points which may be unclear to the reader and some details left unexplained; hopefully the number of such occurrences is small.

[†] This acknowledgement also appears in Part I. This version is slightly updated and expanded.

The names listed above constitute only the more visible contributors to the enterprise. Many, many other people were involved in one stage or another. The magnitude of the task involved in surveying 12,000 students cannot be imagined without experiencing it.

This list of acknowledgements would definitely not be complete without a heartfelt expression of thanks to Ms. Mary Beth Sullivan, Ms. Marcella Walsh and Ms. Sheila Rodriguez, who patiently typed the various parts of this report starting from innumerable illegible manuscripts, through many different typed drafts, to this final version.

The Department of Physics and Astronomy is grateful to the Computer Science Center for support for some of the computer time involved.

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CHAPTER 3. DETAILED ADMINISTRATION OF PATS

3.1 Outline of Chapter

In this chapter we provide, in a "chronological" sequence, the detailed instructions for the initial data collection stages of administering PATS. This includes preparation of some of the data and instructions for the various computer programs. Fuller details for program running are provided in the computer program descriptions in the next two chapters.

Naturally, we leave some details to the imagination. The present purpose is to provide enough information so that PATS can be administered. But we do not intend to be encyclopedic.

Terminology. A "section" refers to the basic unit being evaluated, whether lecture, lab, or recitation; whether faculty or teaching assistant. It generally has one individual who is being evaluated with that section with that questionnaire. (Other terms are defined in Section 5.2, p.5.1).

We present in Table 3.1 (already given in Part I as Table 2) a flow chart of the "step-by-step" operation of PATS. As stated in the note, this chart is a "logical" one, and the "responsibility" for the different parts and even the sequence in which they are performed does not follow this order.

3.2 The Questionnaires

At present PATS uses 7 different questionnaires, to cover 9 different teaching experiences. These questionnaires are given in full in Appendix A1, with the list of courses assigned to each questionnaire given in Appendix A2. Appendix A3 gives a list of "corrections" to the questionnaires for future use when they are reprinted. Appendix A4 repeats Table 1 of Part I, and gives a brief description of each type of questionnaire.*

3.3 Preparation of Packets for Distribution to Instructors

For each section, a large manila envelope is prepared [some large sections require a box] with the following information written on the outside:

name of instructor (T/A's name if appropriate)
course number
section number
lecture/lab/recitation, as appropriate
enrollment (as up to date as possible)
code numbers

The code number is explained further below, in section 3.4. The envelopes are also "rubber-stamped" with (see p. 3.3):

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*Naturally one can change any of the questions on the questionnaires at any time. The present programs are written to accomodate up to 80 questions, each with up to five different choices of answers, plus "abstain". Exceeding such limits would require programming changes.

TABLE 3.1 STEP-BY-STEP OPERATION OF PATS

A. Administering the Questionnaires

   1. Packets of questionnaires and standard answer sheets given to each instructor.
   2. Each instructor informed of the 9-digit code number which identifies his section.
   3. Students fill out answer sheets in class, entering code number on these sheets.
   4. Filled-out answer sheets turned in to departmental office.

B. Preparing and Running DATAREAD and INITPRT

   1. Answer sheets converted to IBM cards by Digitek processor.
   2. Header cards prepared for each section (giving instructors' names, etc.) and placed immediately before Digitek cards for that section.
   3. Control cards prepared for DATAREAD.
   4. Data processed by DATAREAD.
   5. Corrections made to data as needed, DATAREAD rerun if necessary.
   6. INIPRT takes output of DATAREAD and prepares printout for each section.
   7. Printout checked for errors, corrections made to data if necessary.

C. Preparing and Running AGGFORM

   1. It is decided what aggregates will be formed.
   2. Descriptive title and a unique 1-to-4 digit number assigned to each aggregate.
   3. Number of copies of printout needed for each aggregate is determined.
   4. Control cards prepared for AGGFORM.
   5. AGGFORM reads tape produced by DATAREAD, forms and aggregates and prints results as directed by control cards.
   6. AGGFORM output checked for errors, particularly in control cards. Program re-run as necessary.
   7. The desired number of printed copies of the results for each aggregate and for each single section are produced.
   8. Each instructor is given a copy of the results for his section and for all aggregates in his appropriate heirarchy.
   9. All single section and all aggregate results are put on public display.

NOTE: This table shows a "logical" flow chart of operations. In fact many of the steps can and should be done in a different temporal order from that shown here.

ENROLLMENT	Please enter number of students actually participating in course ☐
	Also describe any special situations

Header cards (see section 3.6 below) may be provisionally prepared at this time, or this may be delayed (see section 3.6). The choice is based primarily on the time schedule. If output is wanted as soon as possible, header cards should be prepared in advance, with the expectation that some changes will need to be made. At present questionnaires are issued about three weeks before the end of the term (partly to avoid last minute pressures, and partly to ensure polling labs which sometimes end, except for make-ups, before the end of the semester). Instructors then have a certain latitude in deciding when to issue them. Since as a policy matter output is not made public until after the end of the exam period, then there is a reasonable time available for processing. However, Digitek processing tends to be delayed, since it competes with hourly and final examination grading by Digitek throughout the University, including UMBC.

The envelopes are then filled with questionnaires, answer sheets (standard Answer Sheets-TypeA-produced by Optical Scanning Corporation, and available from the Student Union Bookstore [see Appendix B.1]) sharpened #2 pencils with erasers, and instructions to the instructor (see Appendix B.2). These packets are distributed, and all the same material is subsequently returned with hopefully the filled in answer sheets separated from those that are not used.

Note that an effort is made to determine the number of students "participating" in the course (i.e. excluding those who have given up and are "taking an F"), the number of students who while present deliberately abstained from filling in the answer sheets, and finally the number of full respondents.* [See introduction, instructions, and question 1 on each questionnaire, Appendix A.1; also instructions to the instructor, Appendix B.2]. These efforts do not succeed completely.

3.4 Code Numbers

The standard answer sheet has a space for a 9 digit "student number". It also has several other spaces available. The Digitek process (as presently wired) can read this 9 digit number plus at most two more digits. We first tried using all 11 digits available, but found that students entered the numbers incorrectly. At present, we therefore use only the 9 digit "student number" for a code number that completely identifies the section. All computer programs assume that a section is identified fully by a 9 digit code number. However, the format within which the identification is "packed" within the 9 digits is fully variable.

At present the format is as shown in Table 3.2, p. 3.4.

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*All of these except the number "participating" are determined internally by the various programs. There is thus no need to count the number of returned answer sheets.

TABLE 3.2 CODE NUMBER FORMAT

digits 1, 2, 3: 3 digit course number

digit 4: course designation:
- 0 if "regular" physics
- 1 if "Honors" physics
- 2-4 future physics use
- 5 if regular astronomy
- 6-9 future astronomy use

digits 5, 6, 7: 3 digit section number (excluding the first zero)

digit 8: questionnaire number (presently 1-7)

digit 9:
- 1, 2, 3, 4 "professors" being evaluated, arranged alphabetically if needed, all within same course and section (1 if only 1 prof.)
- 5, 6, 7, 8, 9 teaching assistants being evaluated, arranged alphabetically if needed (5 if only one teaching assistant)

column:	1 2 3	4	5 6 7	8	9
content:	course number	Phys/Astron Hons	section number	quest. #	prof/ /TA

The purpose of digit 9 is to allow for the two uses of questionnaires 6 and 7 [independent lab courses with both "professors" and "teaching assistants" -- though whether these roles are filled by actual faculty or teaching assistants is immaterial]; also to cover the cases when more than one instructor is associated with one section (including team-teaching).

Digits 4 and 9 are read by the various computer programs, but are not used by them in an active way. Digit 8 (questionnaire number) is "tested" by the program.

One could use a longer code number, and even have a special answer sheet printed and a special Digitek plug board wired. PATS prefers to use currently available materials.

While generally it is best to follow the format given in Table 3.2 uniformly, it is permissible to give "fraudulent" code numbers to sections for special purposes, e.g. 111222333. DATAREAD will provide a warning of the "illegal" code number when it comes to that section, but otherwise proceed normally. For instance, if one actually wants to subdivide the responses for one "official" registrar's section by some other fact (e.g. day of week) one could use fraudulent sections numbers, or perhaps fraudulent codes for digit 9.

Further, (see also section 3.6 below), while generally the code number given to the students will be the same as that later used on the header card, it is permissible for these to differ. DATAREAD will use the number on the header card to determine course, section, etc. This freedom is useful when an "error" is detected in the number placed on the packet. Naturally no two sections may have the same header code number, but PATS can accept identical code numbers on student answer sheets in different sections, which may occur by error.

AGGFORM keeps careful count of numbers of sections and numbers of students. Hence, if a single section contains students registered for 2 different courses (e.g. Physics 140 and 209; now 429 and 621) only one packet should be prepared -- otherwise when attempting to combine the responses later, two "sections" will be recorded. [This is a defect of the present AGGFORM -- it would be desirable to alter the program to allow for such "divided" single sections.] Similarly, truly separate sections should not be combined in one packet with one code number, since this will cause errors in all subsequent aggregating.

3.5 Digitek Processing

When the packets are returned, all material other than the used answer sheets are removed. [Both totally filled in sheets, and positive abstainers' sheets are kept.] A cursory spot check to see that the written description on each answer sheet agrees with that on the outside of the packet is perhaps in order at this time. But there is no need to fill in missing code numbers, or correct those entered incorrectly.

If, by error, responses from different sections have been mixed together in one envelope so that they cannot be identified by section, it is necessary to divide them at random into the true (or new) section envelopes, and put a suitable comment on the envelopes and header cards (see below). This is because AGGFORM keeps careful count of numbers of sections involved in aggregating.

For Digitek processing, packets corresponding to questionnaires having up to 40 questions must be separated from those having 41-80 questions, but no other sorting or arranging is needed. Answer sheet packets are taken to the Digitek operator at the Computer Science Center [presently Ms. Linda Chase, in the keypunch room, x2941 -- access through the Dispatcher's Room at north entrance], together with an interdepartmental billing authorization. [The cost is presently 4¢ per answer sheet, and will be raised to 10¢ as of July 1, 1973.]

The Digitek operator must be given the following information and instructions:

1. The "Student" number is 9 digit. No other "identification" columns are used.

2. After the machine selects out sheets with no "student" number marked, or with badly entered numbers, these sheets should be processed. Such sheets should be kept separate (turned face down) and such cards should be kept separate (by rubber band)--within the appropriate packet. There is no need to have badly entered numbers completed at this stage, since numbers need not be present on the Digitek cards.
   Alternatively, these sheets may simply be allowed to continue after the coded sheets; and these cards after the coded cards (i.e., no turning over of sheets, or rubber banding of cards).
   For small sections, it is not necessary to separate the uncoded from the coded responses, but for large sections (e.g., above 30 students) it is very useful. (Naturally, completely blank sheets should be removed and destroyed when selected out.)
   This "separation" causes extra work for the Digitek operator. It is most useful when handling large enrollment lecture courses which also have small lab and/or recitation sections (e.g., Phys 121). For such courses, regrettably, different questionnaires for the same section, or different sections for the same T/A sometimes get mixed together. Then remedial detective work is needed, which is made much easier by this Digitek separation process (see Sections 3.6c and 3.7).

3. Each packet must be kept very carefully separate, and its cards kept with that packet. This is easy for those in envelopes, more difficult for those in boxes.

4. Operator must be informed which packets will lead to 1 digitek card (40 or few questions), and which to 2 cards (41-80 questions).

The user will want to know the format of the processed Digitek cards. In columns 1-9 the Digitek card carries the code number. It also carries a J or K in the 12th column depending on whether it is the first (or only) card corresponding to an individual answer sheet (up to the first 40 questions), or the second card corresponding to the 41-80th questions. Finally, in columns 13-52 it shows answers to individual questions. The user should be warned that the order of the cards is the inverse of that of the answer sheets, after processing; i.e., the top answer sheet corresponds to the last pair of cards. Also note that a response "A" appears as a punched "0", "B" as "1"...,"E" as "4", and no response is left blank.

When the Digitek cards and original answer sheets are returned from the Computer Science Center, the answer sheets are saved since they possibly have written comments, but all further processing makes use only of the Digitek cards. Note that in the Digitek process only the responses to the questions and the code number get transferred to the Digitek cards, but none of the other written identifying information on the answer sheets. It is best not to disturb the order of the answer sheets when they are returned, and the Digitek card deck is being made up. This is so that if errors are later found by the program DATAREAD, they can sometimes be corrected by reference to the answer sheets (cf section 3.7 below).

3.6 Ordering of Sections, Preparation of Header Cards, and Data Deck Assembly

3.6A Ordering of Sections

At some point, whether when first preparing the outside information on the manila envelopes and making header cards in advance (see section 3.3 above), or after the return of the Digitek processed envelopes, all section envelopes must be sorted and ordered in an appropriate way. The following guidelines are ones presently used by PATS. They may be modified as appropriate, but indicate certain rules.

1. Physics must be separated from Astronomy, and each is handled as a completely separate job.

2. Faculty are separated from teaching assistants, and each is handled as a completely separate job. [This may be modified when special cases arise, e.g., a faculty member teaching a recitation. One may even duplicate the header and section cards in such a case, and have the section appear twice.]

3. Within one job, (e.g., physics faculty) all sections belonging to a given questionnaire are handled together -- i.e., an initial sort of the packets by questionnaire type must be performed by hand before assembling the data deck.

4. Within a given questionnaire type sections should be arranged in ascending order of course number. Within a course number they should be arranged by ascending section number for faculty; but for teaching assistants within a given lecture section number they should be arranged by alphabetical order of teaching assistant name, and for a given teaching assistant by ascending recitation or lab section number. [Check carefully that all sections are included.]

5. Within one job, questionnaire types are ordered sequentially from 1 through 7.

3.6B Header Cards

Recall that the Digitek cards only carry the code number as section identification. The Header cards enable the computer programs to be told the instructor's name, the enrollment, and any special comments. More complete details are given in the description of DATAREAD. Probably the most convenient time to prepare header cards is when the packets are returned from Digitek processing, and using these packets as a source of all the information.* Alternatively, they may be provisionally prepared when first preparing the envelopes, with the expectation that corrections will have to be made in a few cases.

As described in DATAREAD Ch. 4 , the header card format is variable. The format presently used by PATS is shown in Table 3.3, p. 3.9.

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* In this case, the returned packets must be checked off on a master list of all sections, which is prepared when the packets are first made; so as to be aware of sections for which packets have been lost, not issued, etc.

TABLE 3.3 HEADER CARD FORMAT

1	2-------10	11 12	13-------------36	37 38	39------73	74 75	76 77 78	79 80
*	9 digit code no.	Δ Δ	instructor's name	Δ Δ	"comments"	Δ Δ	enrolment	Δ Δ

Notes:

* -- this identifies the card as a "header".
Δ -- stands for a "space", i.e., a "blank".
code number -- (cols. 2-10) - this will generally be the same as used when issuing questionnaires, but need not be (useful flexibility if an error in coding has occurred). See further discussion in section 3.4 above.

instructor's name -- (cols. 13-36): 24 characters. This should be typed with last name first. First names and/or initials are optional after the last name. It is important that the first letter of the name appear in the first designated column (13), and that if the same instructor occurs more than once, his name be entered the same way each time.

"comments" -- (cols. 39-73): 35 characters. Generally this will be left blank, but it is available to warn of or explain special situations, e.g. "HONORS," "team-taught with X," "seminar, so questionnaire not issued," "taught by X, not Y," etc. Information may come from the returned packets.

enrollment -- (cols. 76-78). This must be right justified [e.g. 17 must be entered either as Δ17 or 017], and is a (positive) integer between 1 and 999. It should exclude students who have dropped the course, either officially or unofficially (i.e. taking an F) since it is used to determine the proportion of the class that does respond. Again information may come from the returned packet.

KEYPUNCHING OF HEADER CARDS

1. A drum card should be prepared, corresponding to the above format with numeric shift as appropriate.

Such a drum card is the following:

col. 1: /	(automatic duplication)
col. 2-10: blank	(numeric field)
col. 11, 12: —	(skip)
col. 13: 1	(new alphanumerical field)
col. 14-36: A	(alphanumeric field continues)
col. 37, 38: —	(skip)
col. 39: 1	(new alphanumerical field)
col. 40-73: A	(alphanumeric field continues)
col. 74, 75: —	(skip)
col. 76, 77, 78: blank	(numeric field)
col. 79, 80: —	(skip)

2. Crucial Remark. Header cards should be prepared on cards having a non-cut right hand corner. This is so that they can be found easily in the data deck, since digitek cards have the right hand corner lopped off. Ideally the header cards should have a light or "natural" color, so that the print can be read easily.

3. Header cards should be prepared (and later inserted into the data deck) even if for any reason no questionnaire answer sheets have been issued or returned, so that no digitek cards exist. One should still make up header cards, and where appropriate explain the situation in the "comment." The purpose is to keep track of "missing" sections.

4. On the first header card being punched, an * (asterisk) must be punched in column 1. The drum card will automatically go to "numerical shift" for the code number, and for the enrolment. Punch the rest of the header information from the envelope.

a) punch the 9 digit code number (no need to use "numerical shift.")

b) immediately type the instructor's name, then hit the "skip" button.

c) type a "comment" if needed, using numerical shift where needed, (Information may be given for a "comment" on the envelope), then hit "skip." If no "comment" is needed, hit skip immediately.

d) punch the "enrolment" (no need for numerical shift) right justified [e.g. 17 must be punched 017 or "space" 17]. The header card is now finished.

5. Duplicate this header card using the "DUP" button.

6. Type the next header card, starting at the code number (the "asterisk" will be punched automatically), and then proceding as in 4.

In this way two copies of each header card are prepared "effortlessly." If convenient the complete pile of header cards should be read on a printer and checked for errors, but this is not essential.

3.6C Assembly of Data Deck*

One header card is placed in front of its corresponding deck of digitek cards, the duplicate header is placed in another pile, the next header card is inserted, followed by its digitek deck, etc. The order in which sections must be assembled has been discussed above (Section 3.6A). One thus assembles a data deck and a separate deck of (duplicate) header cards. If a section has no digitek cards, its header should still be inserted in the data deck, followed immediately by the next header card.

When assembling the Digitek cards behind each header, it is very useful to visually inspect the separated answer sheets which bore no code number and verify by written information on them that they indeed belong to the section. [Recall instruction 2 to the Digitek operator, Section 3.5 above.] If any do not belong,it should not be too difficult to find the corresponding Digitek cards from the separated card deck and remove them for placement elsewhere as appropriate [remove both J and K cards if the questionnaire has more than 40 questions.] The totally unidentifiable answer sheets and Digitek cards are considered to belong to the envelope where found.

All the "verified" and unidentifiable cards are placed at the head of the Digitek cards for that section, right after the header. The answer sheets are left in the packet, so that they can later be read for comments.

At this point only one questionnaire at a time within one job should be assembled into one subdata deck. These "subdecks" must each be preceded by "control cards" describing the questionnaires in more detail. These are explained in DATAREAD, Chapter 4.

Such control cards also enable "overall" identifying information such as "FALL 1971" or "PHYSICS, FACULTY" to be inserted into the record of each section within one job.

A complete deck* for one job will then consist of:

overall control cards
control cards for questionnaire 1
header
Digitek cards
header

(CONT. on next page)

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*As discussed in Appendix H.5.1 (p. H.5.1), it is possible to assemble and process a partial data deck, and subsequently add on an additional data deck. This (untested) feature could be useful if some sections are delayed for any reason.

(cont.)

Digitek cards
.
.
.
control cards for questionnaire 2
header
.
.
.
.
.
.
.
.
Digitek cards

3.6D Use of Header Card Deck

This deck should be assembled as the complete data deck is assembled, in the same order. It is useful to insert a few blank cards between each questionnaire set and the next, and also at any other appropriate breaks (e.g. to divide undergraduate from graduate, faculty from teaching assistants, etc.).

This header card deck should then be printed (on full 120 character paper) as many times as needed. It provides a "table of contents" for the output of DATAREAD and INITPRT. (AGGFORM, which provides the final copy of output both for sections and aggregates, does produce its own paginated table of contents.) This same table of contents forms the skeleton upon which the heirarchical aggregation tree is built up. Three copies of this list are useful for this latter purpose - one as an untouched original, one as a working sheet, and one as a basis for the final copy. A sample is provided in Appendix C.1 (see particularly top of p. C.3).

3.7 Submittal and Output from DATAREAD and INITPRT

We do not describe here the full details of submittal of data decks to DATAREAD. This is left to the separate chapter on these programs. The control cards carry information on header and code number format, questionnaire format (specifically number of questions on each questionnaire), and overall descriptions, such as FALL 1971 and PHYSICS, FACULTY. All such information must be incorporated into the control cards. It is imperative that the interpretation of these control cards in the output of DATAREAD be checked. Errors in these cards can lead to erroneous output.

A sample partial output of DATAREAD is shown in Appendix D.2. A fuller description is provided in the DATAREAD chapter. For each section the program lists each student's answer sheet data, together with the code number the student entered (if any). The program alerts to any

5. Duplicate this header card using the "DUP" button.

6. Type the next header card, starting at the code number (the "asterisk" will be punched automatically), and then proceding as in 4.

In this way two copies of each header card are prepared "effortlessly." If convenient the complete pile of header cards should be read on a printer and checked for errors, but this is not essential.

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At this point only one questionnaire at a time within one job should be assembled into one subdata deck. These "subdecks" must each be preceded by "control cards" describing the questionnaires in more detail. These are explained in DATAREAD, Chapter 4.

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A complete deck* for one job will then consist of:

overall control cards
control cards for questionnaire 1
header
Digitek cards
header

(CONT. on next page)

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*As discussed in Appendix H.5.1 (p. H.5.1), it is possible to assemble and process a partial data deck, and subsequently add on an additional data deck. This (untested) feature could be useful if some sections are delayed for any reason.

(cont.)

Digitek cards
.
.
.
control cards for questionnaire 2
header
.
.
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.
.
.
.
.
Digitek cards

3.6D Use of Header Card Deck

This deck should be assembled as the complete data deck is assembled, in the same order. It is useful to insert a few blank cards between each questionnaire set and the next, and also at any other appropriate breaks (e.g. to divide undergraduate from graduate, faculty from teaching assistants, etc.).

This header card deck should then be printed (on full 120 character paper) as many times as needed. It provides a "table of contents" for the output of DATAREAD and INITPRT. (AGGFORM, which provides the final copy of output both for sections and aggregates, does produce its own paginated table of contents.) This same table of contents forms the skeleton upon which the heirarchical aggregation tree is built up. Three copies of this list are useful for this latter purpose - one as an untouched original, one as a working sheet, and one as a basis for the final copy. A sample is provided in Appendix C.1 (see particularly top of p. C.3).

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A sample partial output of DATAREAD is shown in Appendix D.2. A fuller description is provided in the DATAREAD chapter. For each section the program lists each student's answer sheet data, together with the code number the student entered (if any). The program alerts to any discrepancy between the header code number and the entered code number by a signal "ID CHECK". [Recall, Sections 3.6B and 3.4, that the header code need not be the same as that originally entered on the packet -- though usually it will be.] All such discrepancies should be considered as indicating possible misplaced answer sheets and Digitek cards. It is recommended that wherever possible one go back to the answer sheets in the packets and analyze all such discrepancies [excluding the obvious errors consisting of student social security numbers!]

Other clues are available within the DATAREAD output, relating to the number of questions on the questionnaire versus the number on the Digitek cards. [The Digitek reader will read all answers up to a possible question 40 on card J, and all answers between questions 41 and a possible 80 on card K. Of course card K is only punched if the Digitek operator has been told to expect more than 40 answers. At present only questionnaire 5 produces only card J, with, in principle, only 20 responses. DATAREAD only reads the number of responses it expects to find, and alerts if the expected JJJJ... or JKJKJK... sequence is broken.

Suppose by error some "misplaced" responses to questionnaire 5 (lab section teaching assistant, 20 questions, only a J card) have been mixed with "correct" responses for the same course, same teaching assistant, same section but for questionnaire 4 (recitsection teaching assistant, 42 questions, J and K cards). Since for example in Physics 121/122 the same teaching assistant does handle lab and recitation, such a mixup can and has occurred. Then DATAREAD will be expecting JKJK... and will find perhaps JKJJKJJK.... It will alert to this error. Similarly it will alert if the opposite mixup has occurred.

Another type of error that has occurred is the mixing up of responses for different sections taught by the same teaching assistant. The ID CHECK alert will give evidence of this.

DATAREAD also enables the header card to be checked, furthermore it anticipates the possibility that by error no header card has been inserted between two Digitek sections.

If for whatever reason cards have been found to be misplaced, the relevant Digitek cards must be physically located in the data deck and moved as appropriate. [Digitek cards are punched but not interpreted. However, since the first 9 columns represent the code number, these 9 columns should be identical for all cards in one section except for erroneous ones. Similarly, the J/K code in the 12th column corresponds to the "number" 1 or the "number" 2 being punched (as well as an upper line that can be ignored). Hence it is not too difficult to find erroneously placed cards.]

After one has verified and corrected the datadeck, one then is ready to prepare an output tape from DATAREAD, and to obtain actual accumulated questionnaire response printed output, section by section, by use of INITPRT.

It is similar to those given in Appendix E.1. Recall this is only an interim output, so that the format has not been edited for complete ease of reading. (Alternatively one can obtain section printout using AGGFORM, cf Ch 4)

Notice that the program determines the number of students who abstain but do fill in at least the code number. This number is estimated, not from the responses to question 1, but from the minimum number of "no response ≡ f" indicated for any of the questions. Generally it will agree with the number of students leaving question 1 unmarked, i.e. "response f" but we have one documented case of a student who responded to other questions after his lack of response to question 1 indicated that he was abstaining! [cf discussion in Section 4.4, p. 4.12]

All distributions refer to students who responded to the full questionnaire (though may have "not responded" to many individual questions). Thus for any question the number of indicated "no response ≡ f" is a true indication of the abstainers to that question. [Except for question 1, where one should also include the totally abstaining students.]

The program prints a warning if fewer than 70% of the "enrolled" students respond to the full questionnaire. This figure is adjustable. It plays a significant role in AGGFORM, and for this reason it is important that enrolment figures be up to date and exclude those "taking an F."

One copy of the output from INITPRT is divided into sections and distributed, together with a copy of the relevant questionnaire, to each evaluated person, together with a request that he inform the PATS administrator within one week of any apparent errors.[*] After such errors have been corrected, if necessary by rerunning DATAREAD and INITPRT and producing a corrected output tape, this output tape (or alternatively punched cards corresponding to this tape) becomes the input for AGGFORM.

3.8 Submittal and Output from AGGFORM

3.8A Aggregates

Once again we leave the full details of AGGFORM to a separate chapter. That chapter describes in detail what aggregates are, how they are specified, etc. Here we indicate guidelines that are followed, and present an actual example of a specification of a heirarchy of aggregates. We first list two of the special types of aggregate that arise.

a) team teaching combinations. Suppose two instructors X and Y have team taught a single section A, and this section is later to be aggregated with other sections B, C. Then one presumably has obtained separate "section" responses A(X) and A(Y) in which the same students specifically evaluated either X or Y. It is possible to compute an equivalent combined aggregate A(X+Y) in which the "average" response to X+Y appears. Symbolically $A(X+Y) = \frac{1}{2} A(X) + \frac{1}{2} A(Y)$. This combination section A(X+Y) is then on a more equal footing with B, C, etc., and is treated as an individual section in subsequent aggregations.

---

[*] Sample memo is given in Appendix D.3, p. D6.

b) complete descriptions (usually for teaching assistants). If a teaching assistant teaches more than one section in a course, one always prepares a complete description aggregate for that teaching assistant, being the aggregate of all his sections.

All "combination" and "complete description" aggregates should always be made. Which higher aggregates are made is a matter of choice. The example given should indicate the type of choices involved.

In general, all other aggregates will combine at least three individual sections. [To aggregate two sections U and V does not make it any "easier" to compare U with V, and the aggregate (U+V) will seem to have more "normative" value than is truly appropriate.]

Initial aggregates should be chosen to provide meaningful combinations of "equivalent" or "peer group" sections. E.g., "all sections of course X," or "all first year physics major courses," etc. One is then likely to go on to "higher level" aggregates, which contain within them previous aggregates, e.g. "all first and second year physics major courses;" and then even "all undergraduate physics major courses," and perhaps even higher.

3.8B Weightings, and Acceptance Criteria

In the chapter on AGGFORM, the different methods of "weighting" the various sections within an aggregate are described. Basically the only ones used by PATS are:

a) P distribution - all included students weighted equally
b) Q distribution - all included sections weighted equally
c) R distribution - all included "components" weighted equally.

[usually a "component" corresponds to a complete description, typically a teaching assistant].

When an aggregate is defined to include a section C, that section is in fact only included in the computation, if the participation rate for that section meets a (variable) level.* If the participation is below that level, no input from X is actually included in the aggregate.*[An "override" feature is available to force the acceptance of designated sections.]

Even when certain sections in a defined aggregate do themselves meet the participation level test, the aggregate is only printed in the output provided the number of accepted components is above a (variable) fraction of the total number of constituents defined to be in the aggregate. Typically " components " are either sections or complete descriptions. Thus this criterion applies when an R distribution is to computed over teaching assistants, with respect to the fraction of teaching assistants with acceptable complete descriptions. [Again an "override" is available.]

The purpose of these criteria (which are more fully described in the chapter on AGGFORM† is to ensure that only unbiased data gets propagated into aggregates. In submitting a list of desired aggregates, it is not necessary to consider such questions in advance, unless one is aware of the need to use the override for some special cases. Generally on the first submittal one will not put in such overrides. One can always go back and resubmit with appropriate overrides.*

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*In fact, even this does not guarantee inclusion, if the section is itself part of a component of the aggregate. For then that component must pass a separate participation criterion.

†See Section 5.2g(p.5.3). Part I Section 2.5,(p.2.5) gives the fullest discussion of these points.

3.8C Specification of Aggregates

In order to prepare all necessary instructions for AGGFORM, as described in that Chapter, one must know which aggregates are to be computed, each such aggregate must be given a number, and each such aggregate must be given a name or title which describes it adequately. It is also possible to add "comments" to each aggregate, which are not part of the title, but explain specific features.

Aggregates are printed out in the order in which they are numbered. The numbering scheme need not use every integer in sequence. Hence, to handle possible later insertions or errors, it is a good practice to number aggregates by tens within a particular group, with larger gaps between groups.

The easiest way to indicate the content of each aggregate is to draw a heirarchical tree, using the header card deck printout (section 3.6 D). In Appendix C.1 we show such a sample heirarchical tree, and in Appendix C.2 we give the corresponding list of names and comments. A careful study of these appendices should make the task self-evident. [The meaning of the numbers in parentheses is explained in section 3.8D.]

Notice of course the following restrictions:
a) aggregates can only be made within one "job",
b) within one job they can only be made within one questionnaire type.

It is therefore possible to use the same numbers for aggregates within separate jobs [but this may lead to confusion]. Within one job all aggregates must have different numbers. A possible scheme is to use 1000 - 1999 for questionnaire 1 aggregates, 2000 - 2999 for questionnaire 2, etc.

Let us now look at the heirarchical tree and headers in detail Appendix C.1 (also see Appendix C.2) . On the first pages of the tree, there is little that is not self-evident. Since each "section" represents a separate faculty lecture group, only P and Q weightings are used. In general, aggregates contain at least 3 sections, except for 3110, which corresponds to a separate subsequence of courses.

On the second page of the tree, things become more complicated. Notice first the use of comments when appropriate. Next, consider the 6000 sequence of aggregates. Course 429 is actually the same course as 621, so that 429010162 is really the same section as 621010162,but contains responses from different students. Aggregate 6010 puts these responses together, and leads to a "complete description" of Martin. Unfortunately, it is counted as two sections [AGGFORM as yet has no facility to add parts of one section and produce one section, but such a modification is fairly easy to program.] Actually Martin, Zorn and Pechacek taught separate groups of students, and each should be counted equally, and each as one section. Aggregate 6030 assembles these three sections into one. But since aggregate 6010 and 6020 are each counted erroneously as 2 sections, Q weighting by "sections would be incorrect. Hence one uses the complete P/Q/R weighting. The R weighting treats aggregate 6010, aggregate 6020, and section 62101061 Zorn equally. A "comment" is included in the "description" of Aggregate 6030 to warn about the incorrectness of the Q weighting.

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*We urge the reader to study Part I Sections 2.4 & 2.5 (p2.2-2.6) to obtain a full understanding of the effects of the various cut-off criteria. A "technical" point, and a "technical" solution, here had profound practical repercussions which should be fully understood.

Let us then turn to the 7000 series. In this case, as shown on the "comments," sections are team taught. Hence one first makes individual combination sections, Aggregates 7000 - 7030 and 7100 - 7120. Each of these count as one section. From these, one then makes course aggregates 7060 and 7160, in the regular way. Finally an aggregate over all such courses is performed to obtain 7200. But one also wishes to obtain complete descriptions of each professor. This is done on a separate tree with aggregates 7040, 7050, 7140 and 7150.

The above examples should be sufficient to indicate the types of flexibility available. Each aggregate is given a title, and one may add to this title "comment cards" with full explanations of any irregularities, etc. Some such comments are shown in Appendix C.2.

3.8D AGGFORM Output and Distribution

AGGFORM can produce four separate outputs for a given job

a) All individual sections
b) All aggregates
c) Multiple copies of aggregates (MULTIPLEMANIA)
d) All complete descriptions.

Each is provided with a table of contents, and each may be printed out as often as is desired. [Samples of (a) and (b) are given in Appendices E.1 and E.2.]

Actually there are many more possible selections such as "all aggregates within an aggregate number interval." These are explained in the AGGFORM chapter.

Presumably (a) and (b) are self explanatory. Output (d) is not particularly used by PATS, and hence is explained in the chapter on AGGFORM. Multiplemania contains multiple copies of aggregates, according to any desired scheme, which however must be specified when the aggregates are first defined and formed. The usual scheme is determined from the heirarchical tree, in such a way that one copy of Multiplemania provides the contents of a "complete heirarchy." This concept is most readily understood if one refers to the heirarchical tree in Appendix C.1.

Aggregate 2000 is of immediate interest to three people, who however are also interested in Aggregate 2040. Aggregate 2040 is of interest to 13 people. A complete heirarchy produces enough (varying) copies of each aggregate so that each person can receive one copy of each of the aggregates in which he appears. [Notice that "higher" aggregates such as 3250 need to be produced in many more copies than do lower level aggregates, such as 3000.]

It is clear that the heirarchical tree contains within itself the information needed to determine the number of copies needed. Nonetheless, in setting up the control cards for AGGFORM, one must specify this number explicitly. The easiest way is as we have done on the List of Aggregate Titles, Appendix C.2. The number in parentheses is the number of total copies of each aggregate that is required. Generally (but contrast 6010) this equals the number of original sections involved, and is cumulative. Thus since (Aggregate 3260)" = "(Aggregate 3120) + (Aggregate 3250), a similar equation applies for the number of copies needed.

Having put such effort into computing all the output of PATS, it is essential to squeeze the fruit fully and distribute the output for maximum accessibility, ease of comparison, and (hopefully) impact. Within one job, each of "all sections" and "all aggregates" can easily run to 200 - 300 pages, and hence they should be put in suitable covers.

The full distribution used by PATS is given in Appendix G.1. In each case, a covering memo (Appendix G.2), and a copy of the appropriate questionnaire or questionnaires is also distributed (do not expect people to keep these from the INITPRT distribution).

The distribution under "A" is self-explanatory. Within one job, one copy of (a) all sections, plus one copy of (b) all aggregates, produces one copy of A.

To make one distribution under B (e.g. to the individual) one copy of "a," and one copy of "c" is needed. Each of "a" and "c" must be hand separated and sorted - BUT THE EFFORT IS WORTHWHILE. The tables of contents of (a) and (c) together with the first pages of each aggregate, give assistance in performing the sorting. Each individual receives copies of all data in which he features as a component.

The distribution under C may be explained by referring to the table of aggregates, Appendix C. There is a course subcommittee whose jurisdiction is all courses within aggregate 3070, and another subcommittee whose jurisdiction is all courses within aggregate 3080. There is also a committee whose jurisdiction is defined by aggregate 3100, which includes both 3070 and 3080. Each committee or subcommittee receives one copy of each section or aggregate within its jurisdiction, plus one copy of each aggregate in which any of the components comes within its jurisdiction.

The distribution under D is similar to C, except that one replaces "committee or subcommittee" by "faculty member."

Within physics, we find that a complete distribution under C and D requires

all sections, faculty	2 copies
all sections, teaching assistants	2 copies
all aggregates, faculty	1 copy
all aggregates, teaching assistants	1 copy
multiplemania, faculty	1 copy
multiplemania, teaching assistants	1 copy

which leaves a lot of surplus (scrap) output. [This may not always work out satisfactorily, in which case one may assign different numbers of copies in MULTIPLEMANIA. This should be thought through in advance of execution of AGGFORM.]

It should be remarked that the major part of the actual CPU computing time is spent on assembling the various print files; more than in actually computing the aggregates themselves. To assemble a large Multiplemania may take 10 - 15 minutes, and require 500 or 750 tracks (i.e. it will overflow on a regular size FASTRAND file). Subsequent "printed" copies of Multiplemania use no CPU time, since they are "SYMMED" out, but tie up the CSC Printers. (Multiplemania can "easily" exceed 1000 pages and lead to an 8 inch stack of paper.) Thus, thought should be given to the necessity for Multiplemania, and to the number of copies of aggregates it should contain. Possible economy measures include:

a) Let Multiplemania contain one less than the number of copies of each aggregate needed, and supplement it by use of one copy of "all aggregates." This "solution" makes the final collation and distribution slightly more complicated.

b) Arrange that each instructor receive copies of only the two or three "lowest" aggregates in which he appears. (These will be the ones closest to representing his peer group.) Refer instructor to the public display of "all aggregates" for higher aggregates. This "solution" is the most satisfactory and efficatious, since very "high" aggregates (e.g. all undergraduate major and graduate courses) are somewhat meaningless, yet are the ones that consume the greatest CPU and printing time in assembling Multiplemania, since they contain so many instructors and hence "need" to appear so many times.

c) Only assemble and print one copy each of "all sections" and "all aggregates." Obtain all other needs by use of a reducing Xerox. Alternatively use Xerox to prepare all needs for distribution to individuals (Multiplemania) but print as many copies as needed for permanent records of "all sections" and "all aggregates."

3.9 Suggested Improvements

As stated before, this report describes the present form of PATS. In the light of the two large implementations of Spring and Fall 1971, various possible improvements have suggested themselves. These are described in Appendix J. In some cases their full significance will only become clear after a reading of the chapter on AGGFORM.

3.10 Optimal Timetable of Operations

The description of PATS which has been given here followed a logical temporal sequence. However, in order to expedite final output, it is possible to prepare various stages in advance. In particular, we believe that every effort should be made to distribute the aggregate results at the same time as the individual section results. For this reason, we strongly recommend that the following stages in PATS be performed prior to the actual issue of the questionnaires to the students:

1. Preparation of one set of Header Cards,but with enrolment left blank. (cf. Section 3.6B)
2. Preparation of control cards for DATAREAD and INITPRT.(cf. Chap. 4)
3. Preparation of aggregation tree and titles (cf Section 3.8C)
4. Preparation of all control cards for all executions of AGGFORM. (cf. Chap. 5)

The reader may object that since the enrolment figures (which are certain to change) must still be added to the header cards, that some other facts about some sections are likely to change, that some comments may need to be added, and that some other unforeseen complications may arise, all the above effort is wasted. But this is not true, since such changes can be anticipated and hence allowed for.

Actually, one can use the header card deck (with no digitek cards) as a "trial" data deck, and use DATAREAD and INITPRT to produce a trial condensed data tape. This tape can then be used as input for AGGFORM, and hence one can test the control card decks for AGGFORM before having any questionnaire data. In this way one can check in advance whether each aggregate is indeed made up of the correct constituents. As previously stated, one is nearly certain to find errors, which can hence be corrected in advance. This debugging can save much time later when actually executing AGGFORM. Furthermore preparation of all the control cards in advance will save much time when actual data exists.

When the actual data is received (i.e. packets, and then the digitek cards), one can then complete and update the header cards, by duplicating them at a keypunch while inserting alterations and enrolments as appropriate, or alternatively one can simply prepare two new header card decks. One can also modify the AGGFORM control cards as necessary at this time; but only a few control cards are likely to need any changes. (We remark that a skilled programmer can actually put the AGGFORM control cards on file in the 1108, and update them by editing via TELETYPE.)

Thus by performing as many stages as possible in advance, one can greatly expedite the time at which final AGGFORM output is available. [Note that this idea has not actually been put to the test!]

3.11 Conclusion

This completes the overall detailed description of PATS. The remaining chapters are rather more technical, and deal with submittal of actual runs under DATAREAD, INITPRT and AGGFORM. They are intended for the person or persons actually submitting runs to the computer, and presume some general computing experience.

CHAPTER 4. INITIAL COMPUTER PROCESSING - DATAREAD AND INITPRT

4.1 General Introduction & Outline of Chapter.

This chapter consists of four sections. The first provides a general overview of DATAREAD and INITPRT. Section 4.2 discusses some of the functions performed by DATAREAD. Section 4.3 (together with related appendices) is a detailed operating mannual for the program - DATAREAD. It need only be read by the person actually handling the computer runs of DATAREAD and INITPRT. It is highly "technical", and need not concern the general PATS administrator. Finally section 4.4 discusses a minor difficulty concerning students who abstain.

Let us expand somewhat on these various topics. We discuss the general nature of the functions performed by the program DATAREAD, since such functions must form an integral part of any such computerized survey procedure . Then in section 4.3 we describe the actual program DATAREAD in more detail, in particular discussing the control cards and instructions for executing DATAREAD. This description (and the program itself) have deliberately been written in a very general way, more general than is needed for the present version of PATS. This generality makes the description somewhat harder to follow, but enables the program to handle rather considerable changes in the PATS procedure. In fact the write up is deliberately written as a completely self-contained document, and does not refer specifically to PATS. The write up can be more readily understood if one makes specific reference to the actual PATS-DATAREAD examples given in Appendix D.1 (which refers to questionnaire 2).

Versions of DATAREAD exist for both the IBM 360 and the UNIVAC 1108. If one uses the UNIVAC 1108 computer, there is then no need to use the program INITPRT. This is because the output tape of DATAREAD can be used directly as input for AGGFORM, which itself will produce printed output for all individual input sections (if necessary, one can run AGGFORM1 without creation of any aggregates in order to obtain this rapidly). Since PATS is presently run at all stages on the UNIVAC 1108, it follows that the program INITPRT is superfluous. Hence this report does not address itself further to operating details for INITPRT.*

Let us return to our main concern, the program DATAREAD. Appendix D.1 presents a sample listing of control cards a) directly as input in the run deck, b) as "directly" printed out with only minor format changes, and c) as interpreted by the program. In any actual run, it is essential that the "interpretation" be checked against the actual questionnaire format, for each questionnaire. For an error in such a control card can be made quite easily, and would lead to erroneous output for all sections! Such a check should be made by the overall PATS administrator, and is really quite straightforward. (As can be seen from Appendix D.1.c, the "interpretations" as printed out are reasonably self-explanatory, and hence can be checked without any knowledge of the control card structure.)

Appendix D.2.a (page D4) shows a part of a sample section DATAREAD printout. It commences with descriptive information taken from the header for that section, then lists the "contents" of each student answer sheet. It

---

**When PATS was first implemented, both DATAREAD and INITPRT were run on an IBM 360. It is for that historical reason that references have been made to INITPRT in this report. But at this time INITPRT is being allowed to die.*

"reads" the contents by using the interpretation information already referred to above, to select certain columns from those on the Digitek card deck. Each student is referred to as a "data set". For each student there is the ID number he entered, followed by a listing of the entries in "each" column of the answer sheet (but again as interpreted from selected columns of the Digitek cards). A blank means no entry was made and 0,1,2,3,4 correspond to (a) (b) (c) (d) (e) respectively.

In the right hand margin of this DATAREAD printout, one sees "ID check" at each data set, since the student-entered ID disagrees with the header ID. Similarly one can get other warnings referring to the sequence of Digitek cards (cf also section 3.7, p. 3.12). Clearly all such warnings must be followed up and dealt with as discussed in section 3.7 (p.3.12) before making the final DATAREAD run. There is no need to "correct" misentered ID numbers if one is "reasonably" sure that the Digitek cards are indeed in the correct sections; on the other hand, all "sequence" errors must be corrected completely before the final run. Any such errors can always be corrected by comparison with the original answer sheets.

In fact, it is possible to "cheat" a little here. As long as the correct sequence is followed, e.g. JKJKJK..., and each member of a JK pair has the same ID number, there is really no need to ensure that the J and K cards belong to the same answer sheet, provided both have entries. This is because all later programs only look at "summed" responses. [On the other hand, if it is anticipated that "correlation" studies of student responses will be made using the Digitek decks at some future time, this shortcut is not allowed.]

At the same time that DATAREAD reads the input Digitek deck, it tabulates the responses for each section, question by question, by summing the number of students who made each response (a) (b) (c) (d), (e) or "blank". These summed distributions of responses are put onto the output file of DATAREAD, (usually on magnetic tape). Appendix D.2.b (p.D.5) shows the format of one such section of the output file. (The whole file is in regular FORTRAN file format, with no "marks" or other divisions between sections.)

The output file of DATAREAD becomes the input for INITPRT, and also (independently) for AGGFORM. INITPRT printout looks similar to individual section AGGFORM printout (cf Appendix E.1) and hence we do not show a sample.

As discussed at the end of section 3.7 (p. 3.14), one copy of the printout of the individual sections is distributed to individual instructors, together with a cover memo, a sample of which is given in Appendix D.3, p. D6. One should either distribute complete section information together with a questionnaire (and request that these be kept for future reference) or simply distribute the first "descriptive" page of the section printout. The latter procedure has the advantage that final section data, i.e. the actual response distributions, can be issued simultaneously with the relevant aggregate distributions, which provides maximum "normative" and psychological impact--the disadvantage is that if an error has crept into the Digitek processing or elsewhere, it may not be spotted until the full section data are distributed. [Naturally the cautious PATS administrator will do some spot checks "by hand" using the original answer sheets, preferably for each questionnaire!]

This completes the overview of the main parts of Chapter 4 and related appendices. In section 4.4 we briefly discuss a minor technical point about how PATS presently (somewhat unsatisfactorily) estimates the number of students who abstain from responding to the questionnaire.

The next topic to be discussed is the program AGGFORM, which forms the content of Chapter 5.

4.2 Some Operative Functions Performed by the Program DATAREAD.

PATS uses header cards as described in Chapter 3 to divide up the digitek data cards into the basic sections. These headers carry the section ID code numbers, as well as detailed information concerning each section (e.g. instructor's name, enrolment, etc.) (see section 3.6, pages 3.7-3.12). Thus, each header card serves three independent purposes:

a) It indicates a division of the digitek cards into a single section. We refer to this as the dividing function.
b) It provides an ID code number for that section.
c) It carries amplifying identification information which interprets the ID code number. We refer to this as "directory" information.

These three functions could well be performed in different ways. In particular, the directory information could instead be "inputted" in a separate part of the data handling, by actually preparing and reading in to the computer such a directory. (With computerized preregistration, the registrar should be able to assist in providing punched directory cards automatically.)

The dividing function could actually be handled in one of several ways:

i) as at present in PATS. The header cards define sections, and carry the ID numbers to be associated with the sections (with the option of also carrying directory information, if desired),

ii) by using divider cards which are all identical, but carry no ID number or directory information (e.g. simply an "asterisk" in column 1), or

iii) by using no divider cards at all, but using the computer to sort the digitek cards into sections.

In cases (ii) and (iii) the ID numbers on the digitek cards would be used by the computer to determine the appropriate sections and ID numbers.

The reader may well object that one knows that students make errors in entering the ID numbers. However, one can program to allow for this. The DATAREAD program has the flexibility to operate under options (ii) and (iii) above. The programming assumes that student errors will not occur systematically. Thus under option (iii), DATAREAD sorts and looks for patterns, and is able to group data cards into sections. Specifically, let individual letters a, b, c... represent the ID numbers as entered by students (with Δ representing a "blank" number). A sequence

abaacΔaa|dddebddΔd|fgggg...

would be divided by the DATAREAD program as indicated by the vertical lines. It is probable that "f" was a misentered "d" or "g." The computer output provides the operator sufficient information so that he can then decide how f should be handled. The program run in this mode will surely be run in several passes. (Even with header cards present, one does move digitek cards to different sections, and make other corrections, so that more than one pass is made.)

As presently written DATAREAD can be run either as in PATS option (i), under scheme (iii), or even under a "mix" of options (i) and (iii). [It could also be modified to operate under scheme (ii).] This flexibility is what "requires" the program description to be rather general. (However, reference to appendices D1 and D2 should clarify the description.) In the "general description" in the following section, one sees (in the second paragraph) that the program sorts (or divides) by the ID number on the digitek data cards automatically, with divider (or header) cards being optional. Hence also the specific contents of the header cards are optional. The program as presently written can be run so that sorting is done purely on the basis of the headers; or (with no headers in the deck) purely on the basis of the digitek card ID's; or primarily by the program on the basis of the digitek card ID's, with header cards overriding and forcing new sections when such headers are found. The sample decks have the form appropriate for sorting purely by headers.

Besides these specialized functions, DATAREAD automatically performs the basic functions of:

a) determining the number of student answer sheets for each section (thus these do not need to be hand counted),

b) determining the summed distributions of answers to each question,

c) printing a "listing" of each student's responses, together with some automatic checks, for validation purposes,

d) preparing an output file which contains all the summed distributions.

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DIGITEK CARD PROCESSING PROGRAM

GENERAL DESCRIPTION

This section should be read in conjunction with the sample PATS run deck given in Appendix D.1.

This program was developed as a means to tabulate responses to questionnaires processed by a Digitek optical page reader which produces punched card output. The program considers each set of responses as a unit of data (data set) which is verified for consistency of content and format. Data sets having like content are grouped together, excluding rejects, into sections, and then the individual responses are summed within each section to form an output file of reduced dimensions.

Although sorting by content is performed automatically, dividers (header cards) may be manually inserted within the input file to force section groupings and provide descriptive information. Sorting may be performed entirely by the header cards, entirely by the program, or primarily by the program with headers overriding.

A large measure of flexibility is provided by run-time specification of the header and data card formats and header content; the program is insensitive to such things as number of forms being processed, programming of Digitek machine, number of responses in a questionnaire, etc. Information of this type which is provided by the user is, whenever pertinent, passed on to the output file. Thus the latter becomes self-descriptive, i.e., subsequent users of the output file who are aware of its format (which is invariant) may access information without re-specifying any input variables.

INPUT FILE

*(This describes the complete input data deck previously discussed in Section 3.6C, p3.11)**

Input to the program may be logically separated into two parts:

(A) data cards (as produced by Digitek) and headers (optional), inserted manually into the data deck; and
(B) program descriptor and command cards, which describe the input and perform simple control functions.

(A1) data cards: *(the Digitek cards - cf. section 3.5, particularly p. 3.7.)**
The content of the data cards is fixed, as follows:

1. Identification field- *(presently the first 9 columns)*
0-12 characters (the limit is arbitrary and can be easily changed in the program) located contiguously anywhere on the card
The ID field is useful in providing coded information that is unique to each section but common to the data sets within a section; it provides the basis for section groupings in the absence of header cards.

2. Questionnaire identifier- *(presently the 8th column)*
1-6 characters located contiguously anywhere on the card to identify the questionnaire; may be part of the ID

3. Sequence field - *(presently a J or K in the 12th column)*
a single character, located anywhere on the card

4. Data field - *(presently starts at the 13th column)*
a contiguous string of characters of any length from the set (0,1,2,3,4,blank). The character set is that used by the Digitek to represent six possible responses to items on the questionnaire, and can be easily changed in the program.

---

* *All entries in italic type refer specifically to PATS, and do not form part of the general program description.*

A data set may contain 1-5 cards, each possessing all of the above fields. The length, content, and position of the ID field should be constant within a data set. Normally each card will have a unique sequence character, which may appear in any position. The data field on each card may have a different length and position, but the total number of data characters is limited to 99. (This may be easily changed in the program).

(A2) header cards: *(cf section 3.6B and table 3.3, p 3.9)*
the content of the header cards is variable, and may contain the following:

1. Recognition character - *(presently an asterisk *)*
   a single character, specified by a program command card (see below) which is used to distinguish among header, data, and command cards; must be present in the first position on the card.

2. Identification field- *(presently columns 2-10)*
   optional; same as data card: The header ID will override subsequent data ID's.

3. Questionnaire identifier- *(presently column 9)*
   optional; same as data card

4. Size field - *(the "enrolment" - presently columns 76-78)*
   optional 3 digit number to indicate the number of possible respondents to the questionnaire, located anywhere on the card, but with the digits right justified within the field

5. Optional fields - *(presently the instructor's name, and "comments")*
   up to 5 additional fields containing general information to be inserted into the output file, and located anywhere on the card

With the exception of the optional fields, all header cards should be consistent regarding which information is present.

(B) Command and descriptor cards: *(cf Appendix D.1 for an actual PATS example)*
The primary purpose of descriptor cards is to describe the format of the data and header cards. Command cards are used to indicate the presence of specific descriptor cards (e.g. "HEADER" command), to signal the program to take some action (e.g. "START" command), or to set a parameter value within the program (e.g. "UNIT" command). The format of the command cards themselves is fixed, as follows:

(1)	recognition character	(col.1)
(2)	6-character label	(col.2-7)
(3)	three 2-digit numbers	(col.8-9,10-11,12-13)
(4)	one blank	(col.14)
(5)	24-character identifier	(col.15-38)

Since the meaning of each field varies according to command type, and the number of different types is small, each type is described separately below. Upper case is used to indicate that a name is to be punched on the card exactly as it appears in the example. The vertical lines are used as field delimiters.

1. Header command and associated descriptor cards

The first card is:

```
col.1      8          15
   |$|HEADER|  |  |  | |                        |
```

The first character on the first card encountered by the program defines the recognition character for all subsequent command cards; a dollar sign is used for illustrative purposes. The header command contains only a label field, and indicates that all subsequent cards up to the next command card will describe header information. *(The dollar sign is used in the actual examples)*

The set of descriptor cards following the header command card is used to establish two specific header fields and a variable number of general header fields. All fields have associated with them a 24-character identifier which is supplied in columns 15-38 of each card. The program recognizes the identifiers "SIZE" and "ID" as being special cases. (The order in which these descriptors are listed is immaterial.)

Size Descriptor card: This has the form:

```
col.1       8         15
   |*|      |  |mm|nn| |SIZE                    |
```

The "SIZE" descriptor card specifies a 3-digit field on the header cards from columns mm to nn as previously described. In addition, a non-blank character in column 1 defines the recognition character for all header cards in the data; this character (an asterisk is used here as an example) is also present on all subsequent descriptor cards which pertain to header format.

ID Descriptor cards: A set of these will have the form:

```
col.1       8         15
   |*|      |  |mm|nn| |ID                      |
   | |      |  |mm|nn| |sub1                    |
   | |      |  |mm|nn| |sub2                    |
   | |      |  |mm|nn| |sub3                    |
   | |      |  |mm|nn| |sub4                    |
   | |      |  |mm|nn| |sub5                    |
```

The "ID" descriptor card specifies the variable length field on the header cards from columns mm to nn as previously described. From 0-5 cards having a blank recognition character follow this card to establish subfields within the ID, designated by the names in the identifier field (sub1, ..., sub5 in the above example). The specifications for these subfields (mm to nn) refer to relative positions within the ID.

General Field Cards: These are used to locate the optional fields; and can also be used to input special information into each record. (*In PATS this is used for the date and subclass*)

```
col.1       8
   |*|      |  |mm|nn| |name                    |
```

The general header fields are specified by 0-5 descriptor cards following the last ID descriptor card (if present). Each card sets up a variable length field on the header card in columns mm to nn which is assigned the name given in the indentifier field.

2. Data command and associated descriptor cards

The first card is:

```
col.1       8         15
   |$|DATA  |  |  |  | |                        |
```

The DATA command contains only a label field. Two types of descriptor cards follow the DATA command to specify the exact format of information on the Digitek cards. Each type is recognized by its identifier, which must be "ID" or "SEQUENCE" as illustrated:

ID Card: This has the form:

```
col.1       8         15
   | |      |  |mm|nn| |ID                      |
```

This specifies that the ID is found in columns mm to nn on the Digitek cards. (It is assumed that any ID subfields are specified with the ID descriptor card that follows the HEADER command card.)

Sequence Cards: These vary from questionnaire to questionnaire, and have the form:

```
col.1       8         15
   |c|      |11|mm|nn| |SEQUENCE                |
```

Each "SEQUENCE" card contains a sequence character, c, which the program will expect to find in column 11 on the corresponding Digitek card, along with the data in columns mm to nn. There must be as many sequence descriptor cards as there are Digitek data cards per data set.

3. Form command and associated descriptor cards. This refers to the questionnaire name. *(In PATS the questionnaires are "named" by the numbers 1 through 7).* The first card is:

```
col.1     8          15
   |$|FORM  |  |  |  | |name                     |
```

Use of the FORM command will supply a 1-6 character name for the questionnaire. It may be followed by descriptor cards to indicate the location of fields on header and data cards, respectively, as shown:

```
col.1     8          15
   |*|      |  |mn|nn| |name                     |
   | |      |  |mn|nn| |name                     |
```

4. Unit command card

This card has the form:

```
col.1     8          15
   |$|UNIT  |nn|  |  | |name                     |
```

The UNIT command is an optional device to respecify the assignment of I/O units used by the program. "nn" is a FORTRAN logical unit number, and "name" represents its corresponding function. Default values are preset to the following which are appropriate for the IBM 360. (For the Univac 1108 one must set PUNCH at the value 01, but the other default values are also appropriate for the 1108.)

name	value	function
CARD	05	card input file
PUNCH	07	output file* (01 for 1108!)
PRINT	06	printed output
SCRATCH	03	intermediate storage unit

5. Start command card

This card has the form:

```
col.1     8          15
   |$|START |  |  |  | |                         |
```

The function of the START command is to mark the end of the set of command cards, and signal the program to begin processing data cards.

6. End command card

This card has the form:

```
col.1     8          15
   |$|END   |  |  |  | |                         |
```

The END command marks the end of data card input for a given questionnaire, and signals the program to expect the next card to be a command card. The START and END commands serve as delimiters for the data cards associated with a single questionnaire. When multiple questionnaires are processed within a single job, fields may be re-specified by command cards located after the END command.

7. Stop command card

This card has the form:

```
col.1     8          15
   |$|STOP  |  |  |  | |                         |
```

When an END command is followed by a STOP command card, the program will terminate operation.

**Punch refers to the output file (cf.p4.9), and is in card image format. However this output file may be realized either on tape, or on a FASTRAND file, or physically as punched cards. Each of these options is illustrated in App D.1.a for the 1108.*

OUTPUT FILE

(This describes the format of the "output file" from DATAREAD, which is used as the input for AGGFORM. While normally written on tape, it may be on cards, and always has card image format.)

In addition to printed output, the program will produce output in punched card format for use with subsequent programs. The description below is intended to supply information that will enable the programmer to utilize this output.

The output file consists of a variable number of data sections for each questionnaire. Output for each section is in two parts: descriptive information, followed by the data. The data itself is simply the sum of all the individual responses of data sets within the section. Both parts are variable length and format, but the logical record size is always 80 characters (card image).

In accessing the file, it is necessary to utilize information provided in fixed format fields to determine the length and format of other information. This allows for a variable amount of information and an optimal data format.

The first card in a section consists of the following:

1) SIZE- *(i.e. the "enrolment")*
   3 digit number equal to the value of the size field on the header card; if there is no header card or this field is not specified, then the value is zero.

2) NSETS- *(i.e. the number of "respondents", including abstainers.)*
   3 digits giving the number of data sets represented in this section.

3) NQUEST- *(i.e. the number of questions on the relevant questionnaire.)*
   2 digits giving the number of questions in the data.

4) L-
   2 digits specifying the number of variable dimensions in 5) below. Maximum is 24.

5) D1,D2,...,Dl-
   variable list of dimensions giving the number of characters in each variable length field to follow.

The remaining cards preceeding the data contain pairs of fields, each having a label followed by its information content. There is a fixed order of occurance, and the first four fields are always the same type. The first field is given the label "QUESTIONNAIRE", and its pair contains the 6-character identifier supplied on the form command card. The third field contains "ID", and the fourth, the ID of the section; or if no ID field was specified by command cards, then this field is filled with asterisks.

If ID subfields were specified, they will appear next, in pairs of label + content, followed by the variable fields from the header card if any.

Starting with the first position on the first card, the pairs of fields are located adjacent to each other until the length of a pair, added to the position of the previous pair would equal or exceed the 80-character limit. In the former case, the pair is simply located on the card, and the next pair if any will begin a new output card. If the latter occurs, then the pair is located at the start of a new card; thus the fields never cross a card image boundary. Output of variable fields is terminated when the list of dimensions has been exhausted; output of section data begins with the next card.

The data output for a section may be in one of three possible formats, depending on the number of data sets included:

NSETS=0,	no data output
0<NSETS<10,	13 groups of six 1-digit numbers per card
9<NSETS<100,	6 groups of six 2-digit numbers per card
99<NSETS<1000,	4 groups of six 3-digit numbers per card

The six positions within a group represent the six possible responses to a given question on the questionnaire form. Each of the six digits gives the frequency with which that response was made for all data sets in the section. Summing the six digits within any group will produce the value of NSETS.

=========
OPERATION
=========

The program expects an input file as described in the section above. Multiple questionnaires may be processed in a single run by following the END command card for the first questionnaire by only those command cards necessary to specify 'parameters' which differ in the next questionnaire. (see example in App. D.1.a.)

If the first card after the START command for a given questionnaire is recognized as a header, then the program will expect all sections to be delimited by header cards, and no automatic sorting by ID fields will be performed*. Furthermore, the ID in the header will override ID's on all data sets up to the next header card*. When a header card is followed by another header card or an END command, it will define a null section, i.e., the descriptive information on the header will be transmitted to the output file, but without accompanying data.

In order for sorting to be performed by the program, the first card following the START command must be a valid data card containing an ID. In the absence of header cards, data sets will be grouped according to ID, with extraneous invalid ID's embedded within a group being overridden; the program will thus attempt to tolerate "bad" ID's in the presence of a series of consistent ones.

The less consistent the ID's are, the more groupings will occur, with the "worst case" being all data sets grouped into separate sections. This will happen even if some of them have identical ID's if they are not contiguous, as the program will not remember back past a small number of groupings.

If a header card interrupts sorting, then all previous data sets are immediately grouped, and the ID on the header card will establish a group which will include at least the next data set.

The intended use of this program is as a multiple pass operation. The first pass(es) are used to sort the Digitek cards into sections and indicate discrepancies in the data, and no output file is produced. After repairing bad data and forcing correct groupings via header cards, a final pass is made to produce an output file for subsequent processing.

IMPORTANT - The PATS user should also read the next subsection on p. 4.11.

==============
IMPLEMENTATION
==============

The program consists entirely of code compatable with IBM FORTRAN IV level G, and is run on a SYSTEM 360/44. A slightly modified version is available using UNIVAC 1108 FORTRAN V; in general, the code is machine independent.

=========
INQUIRIES
=========

Further information is obtainable from the following source:

Computer Systems Staff
University of Maryland Cyclotron Laboratory
Department of Physics and Astronomy
College Park, Maryland 20742

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* *This is the mode in which PATS operates.*

4.3.1 Further remarks on operation of the Program DATAREAD

Section 4.3, together with the sample run deck in Appendix D.1, should provide enough information for operation of DATAREAD. However the following points are worth mentioning.

a) Output file. If the UNIVAC 1108 is being used for DATAREAD the most sensible procedure is to produce the output file directly on tape. Alternatively the output can be punched as cards, or stored as a file on FASTRAND. The implementation of any of these choices is shown in Appendix D.1. DATAREAD is likely to be run several times before all data errors are corrected; only after that will the output file be "useful". It is then used to produce an initial printing for distribution of all sections using AGGFORM1 (cf. Appendix F.1). Only then will certain "header" information errors be "discovered", e.g. wrong enrollment or instructor's name. These are most readily corrected using the 1108 text editor on the previous output file - rather than by rerunning all of DATAREAD with corrected headers. To use the text editor the output file must be on FASTRAND - but it can readily be copied from tape at that time. Recall that a charge for permanant storage on FASTRAND is levied by the C.S.C.

b) The unit command cards (p 4.8 item 4). These show the historical origin of the program are being written for the IBM 360, in that "default" values correspond to that computer. A little thought will show that on the 1108 if one wants the output file on tape or on a FASTRAND file, one can be somewhat cleverer than shown in Appendix D.1a. For one can use the internally set default value of unit 07 for this file, and use @USE 7,PUNCHTAPE or @USE 7,PTDATA without any unit card. However the listings in the appendix are more straightforward conceptually. [See also section 5.12, p 5.23].

c) Program access (cf. Section 5.14, p 5.26). The program DATAREAD will normally be kept on a permanent tape. Appendix D.1a shows how one would read the program off the tape (tape number P1361 say, in 8C9 format) and make it available for execution.

d) Tape saver card. If one puts the output file on tape, and uses a SAVER tape - then it is essential to supply a tape save card when submitting the run!

4.4 A Technical Point on "Abstainers", Also on "Enrollment".

There is one minor technical problem that should be mentioned at this point. As can be seen from Appendix E.1, AGGFORM (and also INITPRT) *attempt* to determine both the number of students who "completed" the questionnaire, and the number who abstained (but participated to the extent of "rendering" an abstention; both of these to be distinguished from the number of students not participating at all (primarily those not present, but perhaps including some students who left the classroom when they saw what was about to befall them!).

It had been hoped that the count of abstainers could be obtained directly from the questionnaire responses to question 1 (cf p. A1.2), but we have many cases (one being fully documented) of a student leaving question 1 blank (i.e. indicating he wished to abstain) and then proceeding to fill in the remainder of the answer sheet! Presumably there will always be some students who insist on being perverse (but hopefully the large majority of students are basically willing to cooperate). As can be seen from the instructions to the students (p. A1.1), an abstainer is requested to fill in the section ID number, and leave everything else blank. As presently written, the program DATAREAD does *not* initially select out such "blank" student data sets to determine the number of abstainers. *All* student answer sheets which are processed into properly sequenced Digitek cards are included in the summed distributions and remain part of both the input *and* output files of DATAREAD.

The programs INITPRT and AGGFORM each *estimate* the number of abstainers are being given by the minimum number of "blank" responses to *any* of the questions on the questionnaire, for the *summed* set of answer sheets within one section. They then subtract this number of "estimated abstainers" from the number of "blank" responses to a *given* question to obtain the "corrected" number of such "blank" responses made to that question by *non*-total abstainers.

All printed distributions are given with respect to the number of students *estimated* to be fully participating. Further AGGFORM actually *alters* the output file records for individual sections from the values inputted, so that the output file actually shows the "corrected" number of blank responses to a given question. [This is done in the part of AGGFORM1 which is called TAPESR.]

A similar "adjustment" is made in the printout, but not in the AGGFORM output file, if it is found that the number of student answer sheets processed is greater than the input value of "enrollment". Such a case (which does occur) does not cause any real difficulty. The number of answer sheets processed is clearly equal to the number of students participating, and this number is divided into an *estimated* number of abstainers and the number of non-abstainers as above. The statistical information at the beginning of each section printout (see e.g. p. B1.1) is suitably modified to make clear what has occurred, and includes the quantity "percent of students participating who completed the questionnaire" instead of the usual quantity "percent of students enrolled who completed the questionnaire". [See also section 5.2.g, p. 5.3, particularly the footnote.]

(The reader will now probably see the significance of some of the remarks made in section 3.5, particularly p. 3.6.)

It should be clear that the method presently used to estimate the number of abstainers is not truly satisfactory. It would be much better for DATAREAD to identify each abstaining student data set directly, and avoid the present estimation procedure. Such a programming modification should be straightforward to implement (see Appendix J).

Alternatively (and perhaps more satisfactorily) the whole procedure for identifying abstainers should be reformulated. Both the instructions to abstainers and question 1 seem to miss their mark - at best they seem to encourage some students deliberately to "sabotage" the system.

We should at this point reassure the reader.The proportion of students who attempt to defeat the system is very small, and the "errors" so introduced are not significant. The problem is not a basic one - yet it would be more elegant to solve it completely.

CHAPTER 5. AGGFORM EXECUTION MANUAL

5.1 Introduction

This chapter is a complete manual on how to run AGGFORM. Section 5.2 simply summarizes the pertinent definitions and concepts which have been introduced in earlier chapters. Those who have read and understood the previous portions of this report (in particular Chapter II) can skip this section.

Section 5.3 gives a quick overall sketch of AGGFORM; Sections 5.4 through 5.9 discuss various aspects of the program; and Sections 5.10 and following get down to the details of preparing a deck of cards to run it.

5.2 Summary of Definitions and Concepts

a) Section

A section refers to the smallest unit of students taught by one instructor, whether in lecture, recitation or lab; and whether one section of a course or a distinct course.

b) Aggregate

An aggregate is a set of percentage questionnaire responses usually formed by combining in various ways the percentage responses of two or more single sections. As an example, we could form "Aggregate No. 100 - All Physics 10 Lectures" by combining the single section responses for each of the Physics 10 lectures.* We compute the results in several ways. The first way is by weighting the number of responding students equally and the second is by weighting each section equally. [We sometimes refer to these as P-weighting & Q-weighting, leading to P- and Q-distributions.]

It is also possible to make aggregates of other aggregates. This leads us to a third type of weighting, that in which each such "input" aggregate is weighted equally. Since different aggregates can be made up of quite different numbers of sections, this is not the same as weighting by section. [We refer to this latter type of weighting as R-weighting, leading to an R-distribution.]

Finally, it is possible to make aggregates out of a mixture of aggregates and sections. In this case the "weighting by aggregate" described in the previous paragraph becomes "weighting by component." This means that if we form an aggregate out of 3 aggregates and 2 sections, each of these 5 entities is called a component and is handled on an equal footing with each of the other components, regardless of whether it is a section or an aggregate. An illustrative example appears below under the entry for "component." [This is referred to as R-weighting, leading to an R-distribution, since it is basically the same as the previous case.]

---

* We use the "old" version of course numbers, and often fictitious ones at that.

c) Combination

If two instructors have shared teaching of a single section, the students will have filled out separate questionnaires for each instructor. Before these results can be aggregated with results from other sections, the two sets of questionnaires must be combined so that we will have just one set of responses for this one section. This is done by forming a special "combination" aggregate, in which the results from the two sets are simply averaged. (For all subsequent purposes, PATS considers such a combination to be a single section)

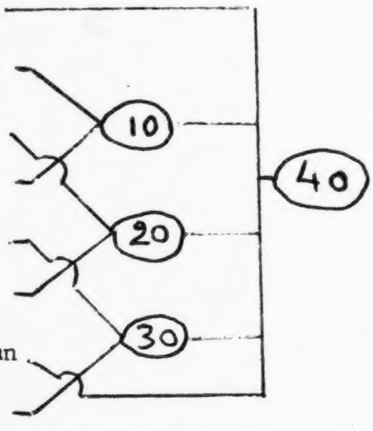
d) Complete Description

Most T/A's and some faculty teach more than one section of a given course. In this case we first form a "complete description" aggregate for each such instructor - namely the aggregate of all sections taught by that instructor. In the case of a T/A who only teaches one section, that section will in itself be the "complete description" for the T/A. It is these complete descriptions which are then used to form higher aggregates. Note that if one instructor teaches sections of two different courses, these should not be aggregated in this manner. Again we refer to the example below under "component." It will be seen that if we did not form such complete descriptions first, then we would have no way of weighting different instructors equally if some teach more sections than others.

e) A Component

This is a section or aggregate which is combined ("aggregated") on an equal footing with other sections or aggregates to form a new aggregate. Consider the following hypothetical situation for Physics 27 recitation sections:

Section	Taught By
101	Brown
102	Green
103	Smith
104	Green
105	Jones
106	Smith
107	Goldman
108	Jones



In this case Brown and Goldman teach one section each, while the others teach two sections each. First we form Aggregates No. 10, 20, and 30 (complete descriptions) for Green, Smith, and Jones, respectively. Then Aggregate No. 20 for example, has two components - sections 103 and 106. In this case both components are single sections. Now we form Aggregate No. 40, the aggregate of all Physics 27 recitation sections. This aggregate has five components - Aggregates No. 10, 20, and 30, and sections 101 and 107. Two of the components are single sections; the other three are aggregates. Each is the "complete description" of a given T/A - i.e., it represents all sections taught by him. Thus all components are treated as "equals." Note that section 108, for example, is not a component of Aggregate No. 40; rather it is only part of one of the components (literally, a component of one of the components).

f) Eligible

We define an Aggregate by setting up a "test." An eligible section or aggregate is one that passes this test. Thus to form the aggregate of all Physics 29 lectures, the test will demand that a prospective component be a Physics 29 lecture. Any section or aggregate that passes this test is now "eligible" for inclusion in the aggregate. Whether or not it is actually included depends on whether it passes the cutoff or not.

g) Cutoffs

There are three cutoffs in AGGFORM; we will call them Nos. 1, 2, and 3. The particular numerical values used for each of these are set by the user in the AGGFORM control cards (cf Section 5.10). Each of these cutoffs refers to a particular criterion of response level.

Consider an individual section, and the fraction f given by: (number of students who actually complete the questionnaire) divided by (the number of students enrolled* in that section). Thus f = (responses)/(enrolled). If this fraction is less then the value of cutoff #1, then this section is considered to be "rejected" , and will not be included in any aggregates unless forced in by the user. The results for this section will be printed out, but preceded by a very stern warning.

If the section response level f is greater than or equal to the value of cutoff #1, but less than cutoff #2, the section is "accepted" and is used in making aggregates; however the printed section results are preceded by a mild warning. Finally if the section response level is greater than or equal to cutoff #2, the section is again accepted and used in aggregates, and the individual section results are printed without any warning.

Cutoff #3 is the rejection level for aggregates and tests the fraction:

$$g = \frac{\text{(number of accepted components)}}{\text{(number of ab initio eligible components)}}$$

---

*In the very special case alluded to near the end of Section 4.4(p4.11), in which the number of answer sheets processed is found to be greater than the number "enrolled", the denominator is taken as the former number instead of the latter.

If for any aggregate, this fraction "g" is less than cutoff #3, then the new aggregate is rejected and no results will be printed out for it. If the fraction of accepted components is equal to or greater than cutoff #3 but below cutoff #2 the results will be printed out with a warning. If the acceptance ratio is equal to or higher than cutoff #2, the results are simply printed out with no special statements. Thus there exists: a single section rejection cutoff, a warning cutoff for both sections and aggregates, and an aggregate rejection cutoff. At present these are set at cutoff #1 = .50, cutoff #2 = .70, cutoff #3 = .51. The use of slightly different rejection cutoffs .50 and .51 for sections and for aggregates is imposed on the basis of the consideration that a response of exactly one-half the students in a section was felt to be acceptable; however, for aggregates this was not felt to be the case, particularly in the obvious case of an aggregate of two sections, which would simply be identical to one of the sections if the other was rejected.** [These cut off values .50,.70 and .51 are actually internally set as "default" values, and will be used automatically unless other values are read in via the print control card (cf Section 5.10.3a,p.5.20)]

5.3 Preparing to Run AGGFORM

AGGFORM is a program which can make up to 20 aggregates at a time (i.e., in a single execution); control cards furnished by the user direct the program as to how many aggregates to make, what to include in them, etc. The program produces printed output as specified by the user, and writes an output tape containing both the contents of the original input, and the newly-formed aggregates.* This output tape can then be the input for another execution of the program, and so on until all desired aggregates have been formed; and at the end of a given execution, the output tape will contain all aggregates formed in all executions up to that point (as well as the original input). Each execution can thus build on the results of previous executions. Since any number of executions can be included in one computer run, the entire processing can in principle be completed in a single run. In practice, however, the processing is done in stages to check for and correct errors in the single section data and in the control cards.

AGGFORM is actually two different programs: AGGFORM1, which reads in the original single section input (on tape or cards); and AGGFORM2, which reads as input the tape produced by the previous execution. It is this second part which is repeated as many times as is necessary.

In order to run the program, it is necessary to go through the steps listed below. An explanation of each step will be found in the remaining sections of each chapter.

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*It is important to remember that at the end of each stage of running AGGFORM, the output tape contains everything that has been done up to that point, including the original input. Thus, for example, printout for the original single sections could just as easily be obtained at the end of the process as at the beginning.

**It is possible to change the cutoff values between executions of AGGFORM. Such changes will not affect aggregates already computed, but will be implemented for all new aggregates.

TABLE 5.1 Sequence of Operations Needed to Run AGGFORM

1. Decide which aggregates are to be formed, and what each is to be called. A "title" of up to 80 characters, including blanks, must be specified for each aggregate. (Any number of additional comment cards (within reason) may be added if desired.)

2. Assign a number from 1 to 9999 to each aggregate, remembering that the final printout will be in order of increasing aggregate number. It is wise to leave room in the numbering system for later insertions. This can be achieved by numbering by tens; for example, aggregates 10, 20, 30 and 40. Aggregates may be created in any order, subject only to the restriction that components of an aggregate must be created in executions which are prior to the execution in which the current aggregate is being formed. It is convenient to use 4 digit numbers with the first digit representing the questionnaire number.

3. Decide how many copies of each aggregate will be needed for distribution to instructors. ("Multiple Mania"). This number must be assigned when the aggregate is first created; it cannot be changed later (unless the program is altered).

4. Determine which aggregates will be combinations, which will be complete descriptions, and which will require weighting by component.

5. Divide the list of aggregates to be made into groups of twenty or less, each group to be formed in a single execution. Remember that combinations and complete descriptions must be created in an early execution, to be available as components of new aggregates in later executions. For the sake of economy, as few executions as possible should be made. But to allow for later "corrections", try to plan on fewer than 20 aggregates per execution.

6. For each execution, make up the control cards which direct the program. There are basically three kinds of control cards, for three parts of the program: TAPE, SELECT, and BL0C1. These cards are described in section 5.10 below. (p. 5.12)

7. Decide on the type of printout desired for each execution. Printout is saved in the computer's mass storage; this way additional copies can be generated as desired.

8. Get the program into the storage banks of the computer. It normally resides on a magnetic tape on a shelf at the Computer Science Center; there is also a back-up tape. Before the program can be executed, it must be loaded into the computer. The procedures needed are described in Section 5.14 below (p. 5.26).

9. Put the control cards together with the standard run decks (see listing in Appendix F). Supply appropriate tape numbers (e.g., tape with single section input on it, tapes for output of successive executions).

10. Submit the job.

5.4 Which Aggregates Should be Made?

All "combination" and "complete description" aggregates should always be made. Which higher aggregates are made is a matter of choice.

In general, all other aggregates will combine at least three individual sections. [To aggregate two sections U and V does not make it any "easier" to compare U with V, and the aggregate (U+V) will seem to have more "normative value"than is truly appropriate.]

Initial aggregates should be chosen to provide meaningful combinations of "equivalent" or "peer group" sections. E.g., "all sections of course X," or "all first year physics major courses," etc. One is then likely to go on to "higher level" aggregates, which contain within them previous aggregates, e.g., "all first and second year physics major courses;" and then even "all undergraduate physics major courses," and perhaps even higher. In the following we consider specific examples which will demonstrate both the straight-forward nature of most aggregates,and the complexity required to handle unusual situations.

An easy way to indicate the content of each aggregate is to draw a "heirarchial tree," using the header card deck printout (section 3.6.D, p. 3.12). In appendix C1 we show such a sample heirarchical tree, and in appendix C2 we give the corresponding list of names and comments. [The numbers in the righthand margin are the number of copies needed in Multiplemania, cf Section 5.6.2, p. 5.8.]

Let us now look at the hierarchical tree and headers in detail (Appendix C1, p. C1.1). On the first page of the tree, there is little that is not self-evident. Since each "section" represents a separate faculty lecture group, only weightings by student and by section are used. In general, aggregates contain at least 3 sections, except for 3110, which corresponds to a separate subsequence of courses. The reader should thoroughly understand what is happening on this first page before attempting the more unusual situations treated in the next two paragraphs.

On the second page of the tree, things become quite complicated. Notice first the use of comments when appropriate. Next, consider the 6000 sequence of aggregates.* Course 429 is actually the same course as 621, so that 429010162 is really the same section as 621010162, but contains responses from different students. (Undergraduates enroll under 429, graduates under 621.) Aggregate 6010 puts these responses together, and leads to a "complete description" of Martin. Unfortunately, it is counted as two sections [AGGFORM as yet has no facility to add parts of one section and produce one section, but such a modification is fairly easy to program.] Actually Martin, Zorn and Pechacek taught separate groups of students, and each should be counted equally, and each as one section. Aggregate 6030 assembles these three sections into one. But since aggregate 6010 and 6020 are each counted erroneously as 2 sections, weighting by sections is not correct. Hence one uses the weighting by component. This weighting treats aggregate 6010, aggregate 6020, and section 62101061 Zorn equally.

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* This case is sufficiently unusual and complex that the average reader need not be overly concerned with it. However, it does provide useful insight into the handling of such troublesome situations.

A "comment" is included in the "description" of Aggregate 6030 to warn about the incorrectness of the weighting by section.

Let us then turn to the 7000 series. In this case, as shown on the "comments," sections are team taught. Hence one first makes individual combination sections, Aggregates 7000 to 7030 and 7100 to 7120. Each of these count as one section. From these, one then makes course aggregates 7060 and 7160, in the regular way. Finally an aggregate over all such courses is performed to obtain 7200. But one also wishes to obtain complete descriptions of each professor. This is done on a separate tree with aggregates 7040, 7050, 7140 and 7150.

The above examples should be sufficient to indicate the types of flexibility available.

5.5 Aggregate Numbers

Every aggregate must be assigned a distinct number between 1 and 9999. The numbering scheme need not use every integer, so that one can arrange the numbering in a convenient way. We have, for example, divided up the numbers so that numbers from 1000 to 1999 correspond to aggregates involving questionnaire 1. Those from 2000 to 2999 involve questionnaire 2. Within each of these groups we number by 10's, thus allowing room for later insertions. An important function of aggregate numbers is to determine the order of the final printout, lowest numbers being printed first. Since aggregates which we want to see printed side by side may actually be created in separate executions of the program, this feature is a very necessary one.

5.6 Printed Output

This section is a brief discussion of what is actually printed for each section or aggregate, and how much control the user has over which aggregates or sections are to be printed at a time.

The computer can produce up to five different "batches" of printed output at a time (i.e., in one execution of the program). A given batch will consist of a table of contents which lists the sections or aggregates which are included in that batch. This is followed by the output for each section or aggregate included in this batch; and finally there is a statement that the end of this batch has been reached. The user can control to a certain extent what will appear in each batch. Within a given batch, aggregates will be printed out in order of increasing aggregate number, and single sections in the order in which they were read in.

The form of the output for each single section or aggregate is as follows. There is first a title line and a place for comments. Then comes a summary of the number of students enrolled, number of responses, etc. For aggregates there is a list of all included components, followed by a list of all rejected components. Then the distributions for each question are printed with headings to explain their meaning.

The different types of output available in a given execution are as follows (see explanation following the list):

1. Newly Formed Aggregates
2. Multiple Copies of all Aggregates
3. All Aggregates, one copy each; or all complete descriptions
4. All Aggregates in a given interval of aggregate number
5. All single sections

5.6.1 Newly Formed Aggregates:

The first kind of output refers to the fact that processing the data requires several executions of the program. "Newly formed aggregates" simply means those aggregates formed in the most recent execution. This is the kind of output one wants when running each execution for the first time. Output of previous executions will already have been checked for errors and corrected, so only the new output will need checking. After all errors have been caught, one will probably not want to generate this type of printout anymore.

5.6.2 Multiple Copies of all Aggregates:

Multiple Mania, as it is commonly called, is necessary if one wishes to distribute copies of the aggregates to the individual instructors included in them (sending each instructor a complete copy of all sections and aggregates would be too massive an undertaking, and might additionally dissuade an instructor from poring over the results). A complete description for one T/A involves just that T/A, whereas the aggregate of all recitation sections in Physics 10 and 11 involves perhaps 20 T/A's. If we want to send each instructor a copy of every aggregate in which he is involved, we obviously need different numbers of copies for different aggregates. Multiple Mania allows the user to specify exactly how many copies he wants of each aggregate.* This batch will then have, say, one copy each of Aggregates 10, 20, and 30, followed by five copies of Aggregate 40 (which might include the previous aggregate plus two other sections), and so on. This batch of output can then be separated by hand for distribution to individuals. (There is an option which allows one to obtain Multiple Mania for only a specified interval of aggregate numbers. See comments below on the fourth kind of output.)

5.6.3 All Aggregates:

The third type of output is self-explanatory. It is intended for public display, for the department chairman, etc., usually together with a copy of the single sections produced by the fifth type of output. (There is an option on this type which, if asked for, produces print just for all complete descriptions.)

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*With the program as presently written, this number must be specified when the aggregate is first created and cannot be changed later. It is the number on the right in Appendix C2.

5.6.4 All Aggregates in an Interval:

The fourth kind of output has not proven as useful as was first hoped. The idea was to print all aggregates (one copy each) within a given interval of aggretate numbers, say everything from aggregate number 10 to aggregate number 90. In practice there is not much need for such an option, except in cases where there is a need for extra copies of certain aggregates for special pruposes, which one does not wish to meet by altering Multiple Mania.

5.6.5 All Single Sections:

This is basically self-explanatory. A possibly useful alteration in the program would be to allow printing of just some of the single sections as opposed to all or none.

It is important to understand that, except for the "new aggregates" batch, the program stores all printed output in the computer's mass storage facilities. Then additional copies of each batch may be easily generated. Thus if one needs four listings of all aggregates, it is not necessary to run the program four times. Rather one generates the initial listing once (in the final execution) and then makes three additional copies. For this reason the numbers of copies requested in Multiple Mania should be divided by the least common denominator of all such numbers. (Making Multiple Mania twice as long is much more costly than making two copies of a shorter version.)

5.7 Type Numbers, And All That

5.7.1 Type Number

This is a number assigned to every aggregate or **single section** which designates what "kind" it is. In particular, it provides a way in which the user can inform the program about aggregates which require special treatment. For example, calling a certain aggregate Type 1 tells the program that this is a combination and should be handled accordingly. Such information must be given to the program through the type number. The following list gives those values of the type number which the user may set; there are other values used internally by the program, but these need not concern us here. Note that a blank (or zero) is equivalent to Type 5. Since this is the most usual case, type number will normally not need to be specified. However one must specify type 1 & type 4 aggregates.*

Type Number	Meaning
0 (or blank)	Same as 5
1.	This aggregate is a combination
4.	This aggregate is a complete description
5.	Normal Aggregate

---

*For the record, type 2 & type 3 refer respectively to single sections & aggregates which are (sub)components of complete descriptions, & type 4 also refers to single sections. See also Section 5.10.3b p.5.22.

To force an aggregate to be accepted (i.e., to be printed out and to be available for inclusion in higher aggregates), one adds 10 to the type number.* This is necessary when an aggregate would normally be rejected due to insufficient response and for some reason we do not wish to lose it. Suppose we are making a complete description for Mr. X, a T/A who teaches four recitation sections. We see that two of his sections had very low response, but the other two had very good response. When the program checks out this aggregate, it will therefore find that exactly 50% of the eligible components were accepted. If the cutoff #3 is set at 50% (as is now the case), this aggregate will be rejected. But we may decide that it is worthwhile to print out this particular aggregate, even though half the sections are rejected. We can force it to be accepted by calling it Type 14. That is, we call it Type 4 to signify that it is a complete description, then add 10 to the type number to force it acceptable.

Whenever an aggregate is rejected (i.e., fails to meet the cutoff) the program automatically sets its type number negative. Thus, for example, type numbers 4, -4 and 14 all refer to complete descriptions, but one is normal (accepted), one is rejected, and one is force accepted. As will be more apparent later, it is hence convenient also to define a "reduced type number".

This is basically the same as the type number, except that it makes no distinction between normal, rejected and forced accepted values. Thus the reduced type number for a complete description is always 4. [A technical point about reduced type numbers is discussed in Appendix H.5.2,pH.5.2].

5.7.2 Prof - T/A Number:

The Prof-T/A number is a code which indicates the rank of the instructor for a given section (or for an aggregate if it is a "complete description"). The values of this number are as follows:

T/A Prof Number	Meaning
1 - 4	professor (set at 1 if only one prof for the section, otherwise used sequentially 1,2,3,4 to distinguish profs)
5 - 9	T/A (set at 5 for one T/A, otherwise used sequentially 5,6,7,8,9 to distinguish T/As)

5.7.3 Course Category:

Course Category is used basically to distinguish honors from non-honors courses, and Physics from Astronomy courses. The values and code are given below. (As presently programmed, this concept does not apply for aggregates)

---

*Thus one enters type number 11., 14., or 10. to force an aggregate which is a combination, a complete description, or "normal", respectively. cf Section 5.10.3.b, p. 5.22.

Course Category	Meaning
0	regular physics
1	"honors" physics
2-4	for future physics use
5	regular astronomy
6-9	future astronomy use

5.8 The Specification of Aggregates

We direct the program by first setting up a series of tests by use of one group of control cards (SELECT cards). Then in a later group (BL0C1 control cards), we tell the program what to include in a given aggregate simply by telling it which test to use. For example, to obtain an aggregate of all Physics 10 and 11 *lectures,* we first set up a test to be used by the program as it examines all prospective components (i.e., all single sections and all aggregates which have been formed in previous executions.) In this particular example the test will check to see if the course number is [illegible] to 10 or 11. If the prospective components include both Physics 10 lectures and Physics 10 recitations, we must also test to see that we are indeed dealing with a lecture. We give this total test a number, say 10. Then later in the control cards, when we give the aggregate a number and name, we tell the program that anything that passes test #10 is eligible for inclusion in this aggregate.

How one "defines" an aggregate is critically important with respect to the question of weighting by component. First we must emphasize that the term "weighting by component" applies only when the components are aggregates or a mixture of aggregates and single sections. If the components are all single sections, then weighting by component does not exist as a *separate* method of weighting. In this case it is identical to weighting by section.

An example should make clear that the way in which we define an aggregate determines whether weighting by component will be produced or not. We can form the aggregate of all Physics 15 and 16 lectures in two ways. We can either *abinitio* aggregate the three Physics 15 lectures and the four Physics 16 lectures, in which case we have seven components, and weighting by component would be equivalent to weighting by section, (and hence it is not separately computed); or we can aggregate two components formed in a *previous* execution - the aggregate of all Physics 15 lectures, and the aggregate of all Physics 16 lectures. In the latter case we do get weighting by component. Note that this kind of weighting *always* involves aggregating components which have been produced in *previous* executions.

It is thus seen that a heirarchical tree (see section 5.4) does not give full information on the definition of an aggregate. One must really specify the components. Generally it should be clear which weightings are appropriate, and hence at what level the components should be taken. For faculty, PATS primarily uses weighting by section.

5.9 Override Controls

There are several override controls in the program which allow the user to alter the normal course of action. In particular, they allow him to overrule the results of the cutoff tests. One of these controls - the ability to force an entire aggregate to be considered acceptable whether it passes the cutoff or not - has already been discussed in section 5.7. This is accomplished by adding 10 to the type number.

Another control allows the user to force into a given aggregate a component which would normally not be included due to insufficient response. Forcing in a component is handled by using the tests exactly like those used to define the aggregates themselves.

For example, we set up test #1 so that each component that passes this test will be included in a certain aggregate, if it meets the cutoff test. Suppose we know that three eligible components will probably fail the cutoff, but we want one of them forced in whether it fails or not. We then set up another test, say test #2, to look for this particular component. Then on the control card which tells the program how to make the aggregate, we say include everything that passes test #1 if and only if it also passes the cutoff, but separately"also"include anything that passes test #2 no matter what. The way in which this is actually set up will be demonstrated in Section 5.11. (A single section will never get included more than once, regardless of the "also".)

5.10 Making Up the Control Cards

We stress once again that care and patience are essential in setting up the control cards for AGGFORM. As with any computer program, simple mistakes (such as the omission of a decimal point) can cause major errors. The entire deck of cards which runs AGGFORM will be discussed later. At this point we are concerned with just one portion of that deck, namely the cards which AGGFORM itself will read in order to direct its operations.

¶ Nearly all of these control cards follow the same format. The 80 columns of the IBM card are treated as 8 separate "fields" of 10 columns each. [When one key punches, a useful aid is to use a "drum card" which should have the form 1AAAAAAAAA1AAAAAAAAA1...etc.]. Each field may contain a number with an explicit decimal point, or a set of "alphanumeric" characters. In the following, the reader should take careful note of the column structure, and the spaces between "items" on each line (i.e. on each IBM card). In our examples we often show the field division columns before 1, and 10/11, at 20/21 etc. and sometimes also in small circled type the actual column numbers. ("Word" entries must always start at the beginning of a field, though numbers with decimals need not.)

The first control card read by the program is a title card for the run (which title is printed out at the top of each page of output). This is followed by three separate groups of control cards, for three parts of the program - TAPE, SELECT, and BLØC1. TAPE reads the input. SELECT sets up a series of tests which describe each group of components which will then be combined to make an aggregate. BLØC1 makes the aggregates and controls the printout. Note that the SELECT tests are set up separately from the cards which name and number the aggregates; only in these latter cards is the program told which test goes with which aggregate. [This separation of the tests from the control cards which name the aggregates is slightly awkward, but results from AGGFORM is being embedded within the structure of the general summarizing program SUMX. The advantages of using SUMX were felt to overweigh the disadvantages . See Md. Tech. Rpt. #763 for more on SUMX.]

The first card of each of these groups of control cards simply bears the name of the group (e.g. TAPE). The first group (for TAPE) contains only one or two additional cards; the other two, however, can have varying numbers of cards, and thus each must end with an end card - END SELECT or END BLØC1, respectively. The latter is followed by a card that says END PASS. Thus the overall set-up is as follows:

```
(title card)
TAPE
(1 or 2 cards)
SELECT
(many select cards)
END SELECT
BLØC1
(many bløc1 cards)
END BLØC1
END PASS
```

Except for title cards, all control cards are divided into eight fields of 10 columns each. Each field may contain one number or one or more words, or may be left blank. If a word is to be placed in a particular field, it must begin in the first column belonging to that field. It is convenient to treat numbers the same way, though it is not necessary. Thus if the number -26. is to be placed in the third field of a particular card, the minus sign would be placed in column 21. <u>All</u> numbers <u>must</u> have decimal points.

5.10.1 Tape Cards

As mentioned before, there are actually two separate programs which make up AGGFORM. These are called AGGFORM1 and AGGFORM2. The former is used only on the first execution, the latter for all subsequent executions. The principal difference between them is that AGGFORM1 reads the original single section data, which is either on cards or on a magnetic tape, and has one particular format; whereas AGGFORM2 reads the output of a previous execution, which is on magnetic tape in quite a different format. For this reason, the TAPE control cards are different for the two programs. We discuss the two programs in turn.

a) AGGFORM1

The first card simply has the word TAPE (beginning in column one). The second and third cards are currently as follows:

```
①         ⑪         ㉑
-99.      12.       1.

2I3,I2/13X,I1,7X,I9,6X,I3,7X,I3,15X,I1,7X,I1/10X,4A6,7X,6A6/5A6,A4
```

These tell the program exactly how to read in the single section data. If the form of the single section data is ever altered (e.g. the course number is shifted to a new position on one of the cards), then these two cards must be altered appropriately.

b) AGGFØRM2

The first card still contains the word TAPE. The second card has numbers in the first two fields; these two numbers are the identifying label for the tape being read (i.e., the output tape of the previous execution). [This previous execution will have been directed to write the proper ID on the tape via one of the BLØC1 control cards. See discussion p.5.21] It is customary to let the first number be the year of the survey in question and the second be 1., 2., or 3., to signify Spring, Summer or Fall. Thus for Fall 1971 we have

```
①         ⑪
TAPE
1971.     3.
```

5.10.2 SELECT

Up to 20 "tests" are defined by the SELECT control cards. Each one must be given a number between one and twenty, and they must be set up in order of increasing test number;*however, it is permissible to skip numbers. That is, a set of tests numbered 1,3,5,7,9,11 and 13 would meet these requirements.

All prospective components which pass a given test are then eligible for later being made into an aggregate by BLØC1, and will be included if they pass the cutoff criteria. Suppose we wish to form an aggregate of all physics 10 and 11 lectures except honors sections. We use SELECT cards to set up a test that the input sections must pass in order to be included. In this case, the test would be that the section in question have its course number equal to 10 or 11, and that the instructor is a faculty member (so we do not include recitations or labs), and that the section is not an honors section. Set up using SELECT cards, this appears as follows:

```
①         ⑪
AND 1TEST

INTERVAL  -6.       10.       11.

AND 1TEST

INTERVAL  -22.      1.        3.

AND 1TEST

INTERVAL  -32.      0.        0.
```

The numeral "1" in the word "1TEST" signifies that this is test number one. The "AND" cards take the place of the underlined "and's" in the above sentence description of the test with one extra "and" at the beginning. The "INTERVAL" card means that the quantity indicated

---

*Contrast this with the statement in Section 5.10.3.b,p.5.22 that sets of aggregate control cards may be assembled in any order!

by the code in the second field ("-6" means the course number, -22 means the TA-PRØF number, * "-32" means course category)* must lie in the interval specified by the last two numbers. In the case of the course number, above, it must be greater than or equal to 10, and less than or equal to 11. If we wanted just Physics 10 lectures, then we would set the last number equal to 10 and have a single-valued "interval." The course category equals one for physics honors sections, so the third INTERVAL card specifies non-honors sections. If our data only includes faculty, then there is no need to distinguish faculty from TA's and the second INTERVAL card (with its AND card) is unnecessary.

Suppose we wanted <u>two</u> intervals of course numbers included in our aggregate. Then our course SELECT cards might look like this:

```
①         ⑪         ㉑          ㉛
AND 1TEST
INTERVAL  -6.       10.         11.
ØR
INTERVAL  -6.       30.         32.
```

This says that a section will pass the test if its course number lies in the interval 10 to 11, <u>or</u> in the interval 30 to 32. The "ØR" card itself is optional and may be left out. Thus, the following is equivalent to the above:

```
AND 1TEST
INTERVAL  -6.       10.         11.
INTERVAL  -6.       30.         32.
```

In the examples to follow we will leave out the ØR cards, but the effect is the same as if they were there.

Suppose now we wish to make three aggregates, for Physics 10 Lectures, Physics 11 Lectures, and Physics 10 and 11 Lectures combined. For simplicity we will deal just with course numbers and ignore the TA-Prof number and course category. We could write our tests as follows:

---

* See Section 5.7 for explanation of type no., TP-Prof no., and course category, etc.

```
①         ⑪         ㉑         ㉛
AND 1TEST

INTERVAL  -6.       10.       10.

AND 2TEST

INTERVAL  -6.       11.       11.

AND 3TEST

TEST      1.

TEST      2.
```

The third test says that a section passes this test if it passes either Test 1 or Test 2. Use of this device saves a lot of redundant writing when the tests involved are longer than one or two lines each. [It can also introduce redundancy if, for example, tests 1 and 2 have an element in common, such as the requirement that the instructor be a faculty member, not a TA., but such duplication is harmless. A section may pass more than one eligibility test, but it is only included once in any case, within one aggregate.]

As illustrated in the example above, the end of one test is signified by the beginning of the next one. Note that there is always one (and only one) blank column after the word "AND" on the AND card. There is no blank between the test number and the word TEST. Thus double-digit test numbers give us "AND 12TEST", etc.

It is important to note that the test number specified on a TEST card must be lower than the number of the test being made. Thus the following sequence is illegal:

```
AND 2TEST

TEST      3.
```

This is also true of the NOT TEST instruction illustrated below.

Finally, suppose we have set up one test to make an aggregate, but wish to exclude sections passing this test from some other aggregate. Then we proceed as in the following example (the code "-7" is for the section number):*

---

* "Section number" here means the number assigned to a particular section of a course in the official schedule of classes. This is the "classical" use of the term "section", as opposed to the more general usage elsewhere in this report.

```
①         ⑪         ㉑          ㉛
AND 8TEST
INTERVAL  -6.       30.         30.
INTERVAL  -6.       32.         32.
AND 8TEST
INTERVAL  -7.       100.        100.
AND 9TEST
INTERVAL  -6.       30.         32.
AND 9TEST
NØT TEST  8.
```

Again we have dealt just with course numbers for simplicity. Test 8 picks up Physics 30 section 100 and Physics 32 section 100. Let us suppose that these are the honors sections, there being no honors section for Physics 31. Then Test 9 gets us all the non-honors sections for Physics 30, 31, and 32; that is, it picks up all sections with a course number in the interval 30 to 32, except those specified in Test 8.

By this time the reader may have observed that a lot of the testing can be done in more than one way. In the example above we got the honors sections by referring to the specific section numbers. We could also have tested the course category to see if it were equal to one. Or to specify that a certain aggregate should include faculty, not TA's, we can either test directly on the TA-Prof number or on the questionnaire number, since there are usually different questionnaires for faculty (lectures) and TA's (recitations and laboratories).

One should understand clearly the relation between OR's and AND's . Suppose we set up a test to ask for either Course 10 ØR Course 11 AND section 100. To be accepted, a prospective component must be section 100 and it must be course 10 or course 11. One might be tempted to read the test as written above to say that it requires either course 10 (any section) or section 100 of course 11. This is not the way the program interprets the tests. AND is primary, and ØR is subordinate (in fact the ØR can be left out.).

The following is a list of the quantities usually tested and the codes for each:

QUANTITY	CODE
Questionnaire No.	-4.
Course Number	-6.
Section Number	-7.
First digit of course no.	-23.
First digit of (3 digit) section no.	-24.
TA - Prof. Number (cf Section 5.7)	-22.
Type Number " " " "	-26.
Reduced Type Number " " " "	-33.
Aggregate Number	-25.
Course Category (not for aggregates)*	-32.
Instructor's Name (first 6 letters)	1008.
Instructor's Name (next 6 letters)	1009.

To form the aggregate of all sections taught by a given TA, say Mr. Casey Jones, we look for his name, testing six characters (including blanks) at a time. The codes are given above; the six characters are put in the fifth field of the INTERVAL card (col. 41-46). Thus we might have

```
①          ⑪                               ㊶
INTERVAL   1008.                           JONES
```

It is important that the name be given exactly as it appears in the single section data (i.e., the header cards). If the name is given as "JONES, CASEY" then the first six characters include the comma. Usually the first six characters are quite sufficient to identify a name unambiguously. Suppose, however, we have a Mr. K. Johnson and a Mr. S. D. Johnson; the names will probably be listed in the data as "Johnson, K." and "Johnson, S. D.". Then the tests would be as follows:

```
①          ⑪                               ㊶
AND 1TEST  ↓                               ↓
INTERVAL   1008.                           JØHNSØ
AND 1TEST
INTERVAL   1009.                           N, K.

AND 2TEST
INTERVAL   1008.                           JØHNSØ
AND 2TEST
INTERVAL   1009.                           N, S.
```

[Notice that periods, commas and spaces all count as letters for the purpose of "first six letters" and "second six letters". The computer compares character by character, and has no imagination.]

---

*As presently programmed, the course category value is not preserved for aggregates even when applicable. Hence one can only test on course category for individual input sections.

It is important that the tests be set up so that they unambiguously define what is to be included in a given aggregate. For instance, a test designed to include Physics 10, Section 109 would pick up both the recitation section #109, and the laboratory section #109; these can be distinguished by adding a test on questionnaire no.

An aggregate continues to have, say, a course number as long as all its components are all from the same course. As soon as an aggregate contains components from more than one course, it ceases to have a course number. This same procedure applies to all identifying quantities.[†] Thus, in the example given on pp. 5.2-5.3 Aggregate 10 still has the appropriate course number and questionnaire number, has no section number, and has an instructor's name. It is a complete description. To form Aggregate 40 one wishes to aggregate the components: aggregates 10, 20, 30 and sections 101 and 107. The easiest way to get this (ignoring questionnaire number, etc.) is[*]

```
| AND 7TEST | 40.*  |        |
|           |       |        |
| INTERVAL  | -6.   | 27.    | 27.
|           |       |        |
| AND 7TEST |       |        |
|           |       |        |
| INTERVAL  | -33.  |  4.    |  4.
```

We are aggregating all sections and aggregates having the correct course number (code -6.) for Physics 27, which are also complete descriptions. (Code -33. selects reduced type number, which is 4. for a complete description.) Notice that sections 101 and 107 are indeed complete descriptions.

The program automatically sets all input sections as being complete descriptions (type number 4.) when they are first read in. When in an execution some such input sections are put together in an aggregate, which is itself specified to be a complete description, the section type and raduced type numbers are changed, so that subsequently only the aggregate is considered a complete description. On the other hand, if the aggregate is not specified to be a complete description, the sections each retain their original reduced type number 4. (though the type number may change as an indication of the accept, reject or force-accept status; hence always use reduced type number for testing).

Thus in the example on pp. 5.2-5.3 and above, each of the eight sections 101-108 are initially tagged as a complete description. In the execution in which aggregates 10, 20 and 30 are made, those aggregates must be specified to be complete descriptions. In that case, after that execution of the sections, only 101 and 107 will retain their complete description status and have reduced type number 4.. Aggregate 40 must be made in a subsequent execution, and will then be correctly assembled. [If made in the same or an earlier execution, it would be incorrectly computed -- but its content list would then provide information which would correspond to the error that had been made.] To form Aggregate 40 one might then test on reduced type number and course and questionnaire number.

---

[*] As a brief remark, we note that if one wishes to keep track of which test goes with which aggregate, he could put the aggregate number (with decimal point as always) in the second field of the first "AND" card of the test. This will have no affect on the program, but can serve as a useful reminder to the user. We always do this in practice, as indicated in this example for aggregate 40.

[†] A present programming "defect" prevents this from being true for course category.

5.10.3. BL0C1

There are several different kinds of control cards for BL0C1 -- the "print" control card and the printout title cards; and the sets of Aggregate control cards.

5.10.3.a. Print Control Card.

The print control card has the following information:

Field	Meaning	
1	Print Control Number (see below)	
2	Minimum Agg. No.	
3	Maximum Agg. No. (The second and third fields are used only if printout for a specific interval of Agg. Numbers has been requested. Otherwise they are left blank.)	
4	First ID word to be put on output tape (usually year of survey; see TAPE cards, above)	
5	Second ID word for the output tape (usually code to distinguish semester)	
6	Cutoff level #1 for single sections (currently .50)	These specific values are internally set as "default" values, and will be used if the relevant field is left blank; but an entry in the field overrides the preset value.
7	Cutoff level #3 for Aggregates (currently .51)	
8	Warning cutoff #2 (currently .70)	

The print control number itself is a five digit number. Each digit corresponds to one type of printout (see section 5.6); if the digit is zero, no printout of that type is obtained. For some of the digits, the particular value of the digit specifies one of several options available. The scheme is as follows (digits are numbered one to five going from left to right):

Print Control Number

Digit	Value	Meaning
1	1	Print out all aggregates formed in this execution, except combinations
	2	Print all new aggregates, including combinations
	3	Print all new combinations
2	1	Print Multiple Mania
	2	Print Multiple Mania for aggregates in specified interval
3	1	Print all aggregates including combinations
	2	Print all complete descriptions[(reduced) type 4 aggregates, and those single sections which are complete descriptions].
4	1	Print all aggregates whose aggregate numbers lie in the specified interval
5	1	Print all single sections

The print card must be followed by one title card for each type of printout selected; i.e., the number of title cards must equal the number of non-zero digits in the print control number. These cards may be (and frequently are) left blank. They must be listed in the order of the (non-zero) digits of the print control no.

Consider the following example:

```
①                   ㉛       ㊶       (51)     (61)     (71)
20001.  |     |     |1971.   |3.      |.5      |.51     |.70
|NEW AGGREGATES
|
|SINGLE SECTION INPUT
```

The print control number, 20001., calls for two kinds of printout, and there are correspondingly two title cards following the print card. The second and third fields of the print card are unused. The tape ID will be 1971/3 (for Fall, 1971). The cutoffs are .5, .51, and .7, respectively.

5.10.3.b. Aggregate Control Cards

The next cards after the title cards are the Aggregate Control cards. For each aggregate there is a card with the word AGGREGATE in the first field, a title card, and up to 14 additional comment cards (if desired). The first card contains the following:

Field	Cols.	Contains
1	1-10	AGGREGATE
2	11-20	Aggregate Number
3	21-30	Type No., if necessary. (not the reduced type no.)
4	31-40	Test Number
5	41-50	Override Test Number, if needed.
6	51-60	Number of comment cards
7	61-70	PQR number- normally left blank (see App. H.1)
8	71-80	Number of copies of this aggregate needed for Multiple Mania.

Again, all numbers must have decimal points. Any field not needed for a given aggregate can be left blank. Following this AGGREGATE card, as stated above, are the title card for that aggregate (up to 72 characters, including blanks) and its comment cards, if any.* An example follows:

```
1)        11)       21)       31)                                     71)
AGGREGATE 1010.     1.        2.                                      2.
PHYSICS 37 - TWEEDLEDUM AND TWEEDLEDEE
```

These are the cards for aggregate no. 1010. The type number is one, so it is a combination. Any section that passes test number 2 will be included, but only if it meets the cutoff (since there is no override in effect). There are no comment cards, and 2 copies are needed for distribution.

The set of aggregate control cards for any particular aggregate must of course be in the sequence AGGREGATE card, title card, and comment cards. But these sets can be entered in any order. There is no need for these to be in ascending order of aggregate number.

---

*AGGFORM automatically inserts two comment cards for any "combination" aggregate (cf Section 5.2c,p.5.2). These state "This aggregate is treated as a simple section. The students enrolled, etc. are taken as the average for the included sections". Naturally "extra" comment cards may also be inserted; cf Appendix F.2, p. F4, Aggregate 7000 for such an example.

5.11 Cards versus Teletype

Once the control cards have been prepared, the run deck can be made up. Before this discussion,however, a few comments are in order concerning the computer. This program was written for the University of Maryland 1108 (UNIVAC) and the following sections apply specifically to this computer.

Up to now we have talked about preparing IBM cards, which would be put together into a run deck and submitted to the computer. This is called a batch run -- one submits a deck of cards with the various instructions for the computer and the control cards for the job, and one gets back, after the job has been run, this deck of cards plus any printed output produced by the job. If, say, one of the control cards is in error, one punches a new card, replaces the erroneous one with it, and resubmits the job.

There is another way to proceed -- namely, by using the teletype. Here one has direct access to the computer, and no cards are involved. Just as one can prepare the control cards and have them ready for insertion into the run deck, so one can type in the control card images with the teletype and store them in the computer's mass storage until needed. If an error in a control "card" is found, one can correct it from the teletype very easily. There is a (per diem) charge for use of the 1108's mass storage, but the convenience may well be worth the expense (at the most $2.00 per day).

Even though the authors' personal choice would be to proceed by using the teletype, the following sections are presented in terms of a batch run. This is easier to explain, and involves the introduction of fewer additional complications (like the EDITOR program used to correct card images stored in the computer). Anyone familiar with teletype operation of the 1108 will have no difficulty translating our discussion to that frame of reference.

5.12 Some 1108 Terminology

Even if the teletype is not used, some understanding of the computer's mass storage and the Exec 8 control language is prerequisite to the successful utilization of AGGFØRM. Some of the statements below are not strictly correct due to simplification; however, the reader should not encounter any difficulties due to this.

1)* A "file" is the standard unit of storage on the 1108's mass storage; it's size is defined merely by how much it contains. There is always an upper limit on how much a particular file can hold. This limit is set by the computer and is usually quite ample.** If it is not, the user can set a larger limit when he first obtains the file. Once a file has been obtained (and "catalogued" -- see below) it will be kept on hand by the 1108 until it goes five*** days without being used. After that it may no longer be saved. One can also obtain a temporary file which is good only for one computer run; as soon as the run is over, the file is destroyed.

---

*We oversimplify, and often refer to this mass storage as FASTRAND.

**At present this limit is 250 tracks (or granules) if the file is to be saved. cf Appendix F, particularly F.5.

***This number has currently been changed to 20 days--it clearly may change!

Files have names assigned to them by the user. A file has one permanent name, the one given to it when first obtained by the user, but it can have other (temporary) names. The name can be made of letters, or numbers, or a combination of both, as long as the total is 12 characters or fewer.

Three types of files which can be used in AGGFØRM are program files, data files, and print files; they differ, as indicated by their names, in their contents.

A file is available for use when it is "assigned" to the run (job). When a file is no longer needed, one can then "free" it (i.e., "un-assign" it). When one frees a temporary (non-catalogued) file, however, it is destroyed. One destroys a catalogued file by "deleting" it. For the 1108, this sequence appears as follows*:

```
@CAT,P     PRTFILE,F/1//250

@ASG,AX    PRTFILE

@FREE      PRTFILE

@DELETE    PRTFILE
```

Here we have catalogued, assigned, freed, and finally deleted a file named PRTFILE. Each line consists of the "@" in column one, an instruction field, <u>then at least one blank</u>, and then the file name. The field at the end on the @CAT card allows one to obtain a larger file than the computer usually allows. For Multiple Mania, which requires a very large file, the 250 should be changed to at least 500. It will be observed in what follows that sometimes file names are followed by periods. The period is usually optional, but sometimes it is necessary (and in at least one case it is not allowed!).

To give a file a <u>temporary</u> name, we employ the @USE statement, as follows:

```
@USE        13,PRTFILE
```

This says that if there is a file named PRTFILE assigned to the run, it can also be referred to as "13". Thus, if this file has been catalogued, we could have the following:

```
@ASG,AX        PRTFILE
@USE        13,PRTFILE
@FREE       13
```

When the last statement above has been executed, the file named PRTFILE will have been freed. Let us now suppose that this file is a print file containing the "printed" output of the program, namely one of the five kinds discussed in Section 5.6. To transfer this information to paper, i.e., to actually print it, we use the following command:

```
@SYM,U      PRTFILE,,PR2
```

---

*NOTE: The CAT and ASG can be replaced here by the single statement @ASG,CPX PRTFILE,F/1//250. This assigns the file and catalogues it <u>if</u> and <u>only if</u> the job terminates correctly.

This will only work if the file in question is a catalogued file and is not assigned to the run when the @SYM command is given. That is, the file must be freed prior to printing. Repetition of this command produces additional copies of the output, one copy for each occurrence of the command.

The above instruction directs the printing to occur on printer #2 (PR2); other choices are PR1, PR3, and PR9. PR1 and PR2 are reasonably reliable and produce easy-to-read output, but are slow. PR3 is very fast but does not produce beautiful print; it should be used to print large batches of output, or anytime when the quality of the print is not essential. PR9 is currently unreliable. Since any one of these printers could be shut down for repairs at any time, it is wise to check with the 1108 dispatcher before submitting the job. A @SYM command to an inoperative printer will simply be ignored by the computer, and no print out made.

Our final comments in this section concern magnetic tapes.* Tapes must also be "assigned" to the run so that they will be available to the program. The required statement is as follows:

```
@ASG,T       INTAPE,8C,9876N
```

The "T" stands for temporary; as soon as the run is over, the tape will be removed from the computer (if it hasn't already been freed and removed). "INTAPE" is the name given to the tape while it is assigned to the run. 9876 (say) is the permanent identifying number of the tape, and the "N" specifies that we only want to read from this tape -- we do not wish to write on it. [If we want to write on the tape we use the letter "R" instead of "N".] When we are finished with the tape, we simply say:

```
@FREE        INTAPE
```

As with the files, the @USE statement supplies a temporary name for the tapes; for example:

```
@USE         9,INTAPE
```

which gives the temporary name 9 to the tape which is actually tape 9876.

5.13 Specific Tapes and Files for AGGFØRM

AGGFØRM always expects to read from and write onto tapes and files having certain specific numbers as their names. AGGFØRM2, for instance, expects the input tape to be named 9. This can be achieved either by assigning the tape with the name 9 to begin with, or by assigning it with another name and employing the @USE statement to give it the temporary name 9. For tapes, the latter procedure is unnecessarily indirect; for print files, however, it can be very useful.

First we give a complete list of the file (unit) numbers involved:

---

*We do not attempt to be complete on this subject. Tapes must be SAVED by use of "tape save" cards, and maintained - or they may be destroyed! SAVER tapes are destroyed after 48 hours unless a tape save card is submitted.

Aggform File Numbers

Output tape (AGGF0RM1 & 2)	11.
Input tape[*] (AGGF0RM2)[*]	9.
Multiple Mania Print File	13.
All Aggregates Print File	15.
Interval of Aggregates Print File	21.
Single Sections Print File	23.

The "New Aggregates" output is printed along with the regular computer output for the job, and hence, no special provision need be made by the user. When, however, the user requests other types of printed output (i.e., non-zero digits in the Print Control Number), he must provide a file with the appropriate number onto which the program can write. Otherwise catastrophe results.

In general one can simply assign (and catalog) files with the appropriate number. The exception to this occurs when one wishes two different copies of the same type of printout. Suppose the user wishes to process data from two different "groups" in the same week, e.g. faculty and T/As, and have, say, the list of All Aggregates from each data set stored on the computer at the same time. Needless to say, one cannot have two distinct files with the same name (in this case 15). Rather, one must catalog the files with distinct names, then give each the temporary name 15 only for the duration of the appropriate AGGF0RM execution.

One final comment about the @SYM statement: Print Files are identified by the number of the job (number on job card) during which they were written. This enables the @SYM'ed output, which is printed separately from the rest of the job, to be returned to the user with his normal output. But this means that if on Monday I write on file 13 in job #2000, and on Tuesday submit job #3000 which does nothing but SYM out an extra copy of file 13, this new copy will be labeled with the number 2000 and will be stored on the shelves of the Computer Center under that number, separate from my deck of cards and normal output from job #3000. Hence it is essential to keep a record of the job numbers in which print files are first created![†]

5.14 Obtaining the Program

It is intended that the program should reside on a magnetic tape (with perhaps also one or more backup tapes containing additional copies) and be read into the computer only when execution is desired. Let us assume the appropriate tape number is XXXX; one prepares for execution as follows:

---

[*] Input to AGGF0RM1 is handled in a special way, even if it is on a tape. See listing of runs in Appendix F.

[†] A truly skilled operator can change this job number on the file to a 6 character name before it is symmed. He would first copy the complete file (or else make sure that a copy had been rolled out the previous night in case of catastrophe), then from TTY use @FILEDIT <file name> and A 1,28 and then C 5,'KACSER' to change the fifth word (which is the job number) to e.g. KACSER (no more than 6 characters). Similarly, of course, an AGGFORM run originally submitted on teletype should always be given a distinctive run identifier.

```
@ASG,T      P,8C,XXXXN

@CAT,P      PATSY.,F/1//250

@CØPIN      P.,PATSY

@FREE       P
```

Actually there are two possible formats for writing on tape. The 8C in the first card refers to one of these. The other format is 8C9. The tape must be read in the same format in which it was originally written. Hence 8C should be replaced by 8C9 if appropriate.

The run decks in Appendix F assume that the program has already been read into a file called KACSER*PATSY.[†] Normally one intends to run at least several executions over a course of a week or so, and it makes sense to leave the program stored in the computer for the duration. This is why PATSY was catalogued in the above example. If one did not need the program again, he could DELETE the file at the end of the job, or, alternatively, merely assign it as a temporary file in the first place:

```
@ASG,T      P,8C,XXXXN

@ASG,T      PATSY,F/1//250

@CØPIN      P.,PATSY

@FREE       P
```

Then when the job is finished, PATSY will vanish.

5.15 Putting Together the Entire Run Deck

Appendix F contains sample decks for running AGGFØRM1 and AGGFØRM2. The preceding sections should have given the reader sufficient understanding to allow him to follow the examples and run AGGFØRM correctly. Details of the @RUN card can be found in the 1108 EXEC 8 USER'S MANUAL.

The examples should be studied carefully together with the material in this chapter. They have "editorial" explanations, and refer to the heirarchy of aggregates discussed in Appendix C.

[†] The "qualifier" KACSER* is the name of the individual who first created the file PATSY in a run which had his name as qualifier (in this case Kacser).

APPENDIX A. THE QUESTIONNAIRES

A.1. The Seven Questionnaires Actually Used Fall 1971

UNIVERSITY OF MARYLAND

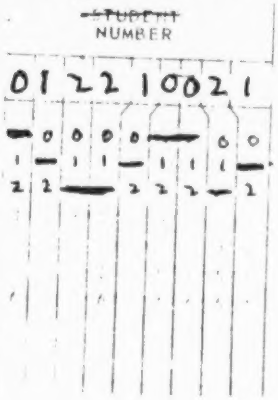
Physics Department

Teaching Questionnaire

Form 1 - "General" Courses (Lecturer)

The purpose of this questionnaire is to obtain in an anonymous fashion your opinion about the physics and astronomy teachers and courses. This information will be used in many ways — to improve each teacher's performance, to help the chairman assign faculty members to courses, and to provide important input in the evaluation of faculty with respect to retention and promotion.

Do not put your student number in the box labelled student number in the lower right hand corner of your answer sheet. Instead put the code number for this course (which should be on the blackboard) in that nine digit space by blocking in the appropriate blocks, e.g. Code Number 012210021 would become:



Your instructor will get the tabulated results of this questionnaire, together with any written comments, after the final grades in this course have been submitted.

General Instructions

1. All entries must be on the STANDARD ANSWER SHEET. Comments must be written on the back of this sheet.
2. Use a Number 2 pencil only. Each question must have either one block only or no block marked. Multiple answers are not allowed, so that a wrong answer must be erased carefully and completely. To mark the response (f) leave all spaces blank. This will be counted.
3. Black in your course code number in the nine digit space labelled "Student Number" on your Standard Answer Sheet.
4. Finally, please write on the top of the Standard Answer Sheet the course number; section number; name of the specific person whom you are evaluating; and whether this is a lab, recitation, or lecture; (e.g., "Phys 100, Section 201, John Doe, Lab.") This information should also be on the blackboard.

m.V. || Even if you do not fill out the questionnaire please carry out instructions 3 and 4, and return the otherwise blank answer sheet. Thank you for your cooperation. ||

Questions:

1. With regard to this questionnaire:

   (a) You basically approve of such questionnaires, and hence you are responding to the whole questionnaire.
   (b) You find such questionnaires an imposition, but in spite of this view, you are responding to the whole questionnaire.
   (f) (i.e. leave blank) You disapprove of such questionnaires, and hence (PLEASE, after filling in the code number) intend to abstain completely.

2. The lecturer presented the historical origins of ideas and concepts -

   (a) most of the time
   (b) some of the time
   (c) very infrequently
   (d) never
   (f) no answer (i.e. leave blank)

3. In reference to question 2, I prefer -

   (a) Much more
   (b) more
   (c) about right
   (d) less
   (e) much less
   (f) no answer

4. The lecturer related physics to other disciplines -

   (a) very infrequently
   (b) some of the time
   (c) never
   (d) most of the time
   (f) no answer (i.e. leave blank)

5. In reference to question 4, I prefer -

   (a) much more
   (b) more
   (c) about right
   (d) less
   (e) much less
   (f) no answer

6. The lecturer brought out the "philosophical" beauty in the subject, i.e. some feeling for the internal symmetry and logic of the subject -

   (a) most of the time
   (b) some of the time
   (c) very infrequently
   (d) never
   (f) no answer (i.e. leave blank)

7. In reference to question 6, I prefer -

   (a) much more
   (b) more
   (c) about right
   (d) less
   (e) much less
   (f) no answer

8. The lecturer related class topics to students' lives and concern, and more generally to the outside world -

   (a) a lot of the time
   (b) very infrequently
   (c) some of the time
   (d) never
   (e) as often as possible
   (f) no answer

9. In reference to question 8, I prefer -

(a) much more
(b) more
(c) about right
(d) less
(e) much less
(f) no answer

10. Due to my taking this course, my interest and appreciation for the subject -

(a) have increased greatly
(b) have increased a bit
(c) have remained unchanged
(d) have decreased somewhat
(e) have been completely turned off
(f) no answer

11. The lecturer and course stimulated my intellectual curiosity and provoked independent thinking -

(a) a great deal
(b) quite a lot
(c) a little
(d) not at all
(e) had negative effect
(f) no answer

12. I evaluate the lecturer's knowledge of the subject as being -

(a) excellent (b) good (c) satisfactory
(d) less than satisfactory (e) incompetent
(f) no answer

13. His ability to get the material across to me is -

(a) excellent (b) good (c) satisfactory
(d) poor (e) zero (f) no answer

14. His preparation for class is

(a) excellent (b) good (c) satisfactory (d) less than satisfactory
(e) poor (f) no answer

15. The lecturer -

(a) usually started and ended his class on time
(b) sometimes started late or ended late
(c) frequently started late or ended late
(d) frequently started late and also ran over
(e) often called off class or didn't show up
(f) no answer

16. The course as a whole was planned and organized -

(a) extremely well
(b) well
(c) acceptably
(d) rather poorly
(e) extremely poorly
(f) no answer

17. In my opinion the inclusion in the course of lecture demonstrations, films, and visual aids was -

(a) too much
(b) good
(c) adequate
(d) not enough
(e) too little
(f) no answer

18. The lecturer's apparent concern in teaching this class showed that he was -

(a) exceedingly interested (b) usually quite interested
(c) fairly interested (d) only occasionally interested
(e) bored (f) no answer

19. His attitude toward questions in class was -

(a) very encouraging (b) usually encouraging (c) adequately receptive
(d) flippant (e) discouraging (f) I have no opinion

20. From my experience, the teacher's availability for questions outside of class hours was -

(a) encouraging and generous of his time
(b) usually available
(c) barely adequate
(d) discouraging and usually unavailable
(e) always unavailable
(f) I have no opinion

21. The feeling between the lecturer and the students was -

(a) that of strong goodwill (b) that of goodwill (c) neutral
(d) negative (e) antagonistic (f) no answer

22. The exams -

(a) always covered material or techniques emphasized in the course
(b) usually covered material or techniques emphasized in the course
(c) sometimes covered material or techniques emphasized in the course
(d) frequently covered material not emphasized in the course
(e) were totally unrelated to the course
(f) no answer

23. The exams and grading in the course were -

(a) much too easy; easy to get good grade without adequate understanding
(b) a little too easy
(c) very fair
(d) somewhat too difficult to get a good grade
(e) much too hard
(f) no answer

24. The assignments in the course were -

(a) much too hard or much too long
(b) generally somewhat too difficult or somewhat too long
(c) about right for the course
(d) not quite adequate
(e) non-existent or grossly inadequate
(f) no answer

25. The problems and/or questions assigned were -

(a) very useful in understanding the material
(b) helpful in understanding the material
(c) somewhat helpful in understanding the material
(d) generally not well selected
(e) poorly selected
(f) no answer

26. The text(s), handouts, readings, etc. were -

(a) excellent (b) good (c) satisfactory
(d) less than satisfactory (e) poor (f) no answer

27. If you were to take another physics course at approximately the same level in which this person was teaching, you would -

(a) eagerly seek his section out
(b) take his section if convenient
(c) have no strong feelings
(d) avoid his section if easily possible
(e) avoid him like the plague
(f) no answer

28. On the basis of this person's teaching in this course, I think that he -

(a) merits appropriate recognition for his truly outstanding teaching
(b) is a good teacher
(c) has the potential of becoming a good teacher
(d) is an adequate teacher, but without much potential
(e) should not be retained as a teacher in this course
(f) no answer

29. The math and/or physics background that I assumed was needed in this course was -

(a) sufficient to handle the course
(b) inadequate, but the instructor filled in the gaps
(c) inadequate and further, the instructor failed to fill in the gaps
(d) greater than needed
(e) poorly related to the course
(f) no answer

30. In my opinion the general level and speed of the course were -

(a) much too hard and/or much too fast
(b) somewhat too hard and/or somewhat too fast
(c) just right
(d) a little too easy and/or a little too slow
(e) much too easy and trivial
(f) no answer

31. His use of examples and illustrations was -

(a) excellent and effective
(b) good
(c) adequate and helpful
(d) less than satisfactory
(e) noticeably lacking
(f) no answer

For each of the following possible bad habits, mark block (a) if and only if the instructor suffers from it, and it would be desirable for him to correct it; otherwise make no mark -

32. inaudible	(a) should be corrected
33. writing was illegible	(a) should be corrected
34. spoke either too fast or too slow	(a) should be corrected
35. monotonous style of speaking	(a) should be corrected
36. poor organization on blackboard	(a) should be corrected
37. lectured to the blackboard	(a) should be corrected
38. paced too much	(a) should be corrected
39. "hums" and "haws"	(a) should be corrected
40. distracting or nervous mannerisms	(a) should be corrected
41 caustic or sarcastic manner	(a) should be corrected
42. any other bad habits? Mark (a) if "yes" and specify on the reverse side of answer sheet	(a) yes

For each of the following positive qualities, mark block (a) if the instructor has it to a high degree -

43. is articulate	(a) yes
44. has excellent organization on blackboard	(a) yes
45. has very well paced lecture	(a) yes
46. has a lively style of speaking	(a) yes
47. has cheerful or pleasant disposition	(a) yes
48. speaks directly to the class	(a) yes
49. has a sense of humor when called for	(a) yes
50. he motivated me to do my best work	(a) yes
51. he discussed his actions, decisions, and selection of topics	(a) yes
52. he made difficult topics easier to understand	(a) yes

53. he summarized major points (a) yes
54. he stated objectives for each class section (a) yes
55. he discussed practical applications (a) yes
56. Any other outstanding positive qualities? Mark block (a) if yes, and specify on the reverse side of answer sheet (a) yes

57. Do you think this Questionnaire asked the right questions? If yes, mark (a) If not, mark (b) and specify on the reverse side of answer sheet.

(a) yes
(b) no (specify on the reverse side of answer sheet).
(f) I prefer not to answer.

58. Please discuss on the back of the answer sheet anything you particularly liked about the course or particularly disliked. Did you make such a comment?

(a) yes (f) no (i.e. leave blank)

59. Your class is -

(a) freshman (b) sophomore (c) junior
(d) senior (e) graduate or special student (f) I prefer not to answer

60. Your major is in the area of -

(a) humanities (b) social sciences (c) life sciences
(d) physical sciences (e) other (mark here, and specify on the reverse side of answer sheet) (f) I prefer not to answer

61. How many hours of work outside class did you put in on this course? (exclude hours related specifically to lab) -

(a) between 0 and 2 hours per week
(b) between 2 and 4 hours per week
(c) between 4 and 6 hours per week
(d) between 6 and 8 hours per week
(e) over 8 hours per week
(f) I prefer not to answer

62. In the course do you expect to get -

(a) a good grade (b) an average grade
(c) a poor grade (d) I prefer not to answer

63. How many classes of this instructor have your missed -

(a) none (b) very few (c) few
(d) many (e) nearly all (f) I prefer not to answer

64. You are taking this course -

(a) to fulfill a General Education requirement
(b) to fulfill a requirement of my program
(c) elective, chosen because of my interest in the subject
(d) elective, chosen because I needed an easy course
(e) elective, chosen because I heard the course or professor was good
(f) I prefer not to answer

65. Of the courses that would have served my purpose, this one was -

(a) only choice that fulfilled my needs
(b) my first choice
(c) my second choice
(d) only course still open
(f) I prefer not to answer (i.e. leave blank)

UNIVERSITY OF MARYLAND

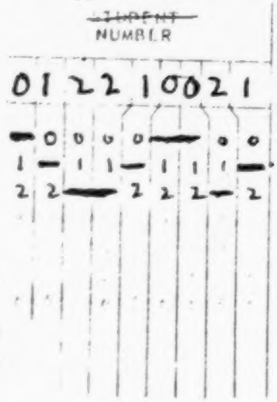
Physics Department

Teaching Questionnaire

Form 2 - "Service" Courses (Lecturer)

The purpose of this questionnaire is to obtain in an anonymous fashion your opinion about the physics and astronomy teachers and courses. This information will be used in many ways — to improve each teacher's performance, to help the chairman assign faculty members to courses, and to provide important input in the evaluation of faculty with respect to retention and promotion.

Do not put your student number in the box labelled student number in the lower right hand corner of your answer sheet. Instead put the code number for this course (which should be on the blackboard) in that nine digit space by blocking in the appropriate blocks, e.g. Code Number 012210021 would become:



Your instructor will get the tabulated results of this questionnaire, together with any written comments, after the final grades in this course have been submitted.

General Instructions

1. All entries must be on the STANDARD ANSWER SHEET. Comments must be written on the back of this sheet.

2. Use a Number 2 pencil only. Each question must have either one block only or no block marked. Multiple answers are not allowed, so that a wrong answer must be erased carefully and completely. To mark the response (f) leave all spaces blank. This will be counted.

3. Black in your course code number in the nine digit space labelled "Student Number" on your Standard Answer Sheet.

4. Finally, please write on the top of the Standard Answer Sheet the course number; section number; name of the specific person whom you are evaluating; and whether this is a lab, recitation, or lecture; (e.g., "Phys 100, Section 201, John Doe, Lab.") This information should also be on the blackboard.

Even if you do not fill out the questionnaire please carry out instructions 3 and 4, and return the otherwise blank answer sheet. Thank you for your cooperation.

Questions

1. With regard to this questionnaire:

   (a) You basically approve of such questionnaires, and hence you are responding to the whole questionnaire.
   (b) You find such questionnaires and imposition, but in spite of this view, you are responding to the whole questionnaire.
   (f) (i.e. leave blank) You disapprove of such questionnaires, and hence (PLEASE, after filling in the code number) intend to abstain completely.

2. I evaluate the lecturer's knowledge of the subject as being -

   (a) excellent (b) good (c) satisfactory
   (d) less than satisfactory (e) incompetent
   (f) no answer

3. His ability to get the material across to me is -

   (a) excellent (b) good (c) satisfactory
   (d) poor (e) zero (f) no answer

4. His preparation for class is -

   (a) poor (b) satisfactory (c) good
   (d) less than satisfactory (e) excellent (f) no answer

5. The lecturer -

   (a) usually started and ended his class on time
   (b) sometimes started late or ended late
   (c) frequently started late or ended late
   (d) frequently started late and also ran over
   (e) often calls off class or doesn't show up
   (f) no answer

6. The course as a whole was planned and organized -

   (a) extremely well (b) well (c) acceptably
   (d) rather poorly (e) extremely poorly (f) no answer

7. In my opinion the inclusion in the course of lecture demonstrations, films, and visual aids was -

   (a) too much (b) good (c) adequate
   (d) not enough (e) too little (f) no answer

8. The lecturer -

   (a) seldom made the underlying physical ideas clear
   (b) never made the underlying physical ideas clear
   (c) usually made the underlying physical ideas clear
   (d) always made the underlying physical ideas clear
   (f) no answer (i.e. leave blank)

9. The lecturer's ability to make the subject interesting -

   (a) excellent (b) good (c) satisfactory
   (d) poor (e) zero (f) no answer

10. The lecturer's apparent concern in teaching this class showed that he was -

   (a) exceedingly interested
   (b) usually quite interested
   (c) fairly interested
   (d) only occasionally interested
   (e) bored
   (f) no answer

11. His attitude toward questions in class was -

(a) very encouraging (b) usually encouraging (c) adequately receptive
(d) flippant (e) discouraging (f) I have no opinion

12. From my experience, the teacher's availability for questions outside of class hours was -

(a) encouraging and generous of his time
(b) usually available
(c) barely adequate
(d) discouraging and usually unavailable
(e) always unavailable
(f) I have no opinion

13. The feeling between the lecturer and the students was -

(a) that of strong good will (b) that of good will
(c) neutral (d) negative
(e) antagonistic (f) no answer

14. Does the lecturer make the distinction between the important points of the subject and incidental information -

(a) yes, he always makes that distinction very clearly
(b) he makes that distinction clear in most instances
(c) sometimes he does, sometimes he doesn't
(d) for the most part such a distinction is not made
(e) never
(f) no answer

15. The exams -

(a) always covered material or techniques emphasized in the course
(b) usually covered material or techniques emphasized in the course
(c) sometimes covered material or techniques emphasized in the course
(d) frequently covered material not emphasized in the course
(e) were totally unrelated to the course
(f) no answer

16. The exams and grading in the course were -

(a) much too easy; easy to get good grade without adequate understanding
(b) a little too easy
(c) very fair
(d) somewhat too difficult to get a good grade
(e) much too hard
(f) no answer

17. The assignments in the course were -

(a) much too hard or much too long
(b) generally somewhat too difficult or somewhat too long
(c) about right for the course
(d) not quite adequate
(e) non-existent or grossly inadequate
(f) no answer

18. The problems and/or questions assigned were -

(a) very helpful in understanding the material
(b) helpful in understanding the material
(c) somewhat helpful in understanding the material
(d) generally not well selected
(e) poorly selected
(f) no answer

19. The text(s), handouts, readings, etc. were -

(a) excellent (b) good (c) satisfactory
(d) less than satisfactory (e) poor (f) no answer

20. The grading and commentary on the homework was -

(a) carefully done and helpful
(b) adequately done
(c) less than satisfactory
(d) arbitrary and unfair
(e) not done
(f) no answer

21. If you were to take another physics course at approximately the same level in which this person were teaching, you would -

(a) eagerly seek his section out
(b) take his section if convenient
(c) have no strong feelings
(d) avoid his section if easily possible
(e) avoid him like the plague
(f) no answer

22. On the basis of this person's teaching in this course I think that he -

(a) merits appropriate recognition for his truly outstanding teaching
(b) is a good teacher
(c) has the potential of becoming a good teacher
(d) is an adequate teacher, but without much potential
(e) should not be retained as a teacher in this course
(f) no answer

23. The math and/or physics background implied by the prerequisite of this course was -

(a) sufficient to handle the course
(b) inadequate, but the instructor filled in the gaps
(c) inadequate and further, the instructor failed to fill in the gaps
(d) greater than needed
(e) poorly related to the course
(f) I don't know the official prerequisite

24. In my opinion the general level and speed of the course were -

(a) much too hard and/or much too fast
(b) somewhat too hard and/or somewhat too fast
(c) just right
(d) a little too easy and/or a little too slow
(e) much too easy and trivial
(f) no answer

25. His use of examples and illustrations was -

(a) excellent and effective
(b) good
(c) adequate and helpful
(d) less than satisfactory
(e) noticeably lacking
(f) no answer

For each of the following possible bad habits, mark block (a) if and only if the instructor suffers from it, and it would be desirable for him to correct it; otherwise make no mark -

26. inaudible	(a) should be corrected
27. writing was illegible	(a) should be corrected
28. spoke either too fast or too slow	(a) should be corrected
29. monotonous style of speaking	(a) should be corrected
30. poor organization on blackboard	(a) should be corrected
31. lectured to the blackboard	(a) should be corrected
32. paced too much	(a) should be corrected
33. "hums" and "haws"	(a) should be corrected
34. distracting or nervous mannerisms	(a) should be corrected
35. caustic or sarcastic manner	(a) should be corrected
36. any other bad habits? Mark (a) if "yes" and specify on the reverse side of answer sheet	(a) yes

For each of the following positive qualities, mark block (a) if the instructor has it to a high degree -

37. is articulate (a) yes
38. has excellent organization on blackboard (a) yes
39. has very well paced lectures (a) yes
40. has a lively style of speaking (a) yes
41. has cheerful or pleasant disposition (a) yes
42. speaks directly to the class (a) yes
43. has a sense of humor when called for (a) yes
44. he motivated me to do my best work (a) yes
45. he discussed his actions, decisions, and selection of topics (a) yes
46. he made difficult topics easier to understand (a) yes
47. he summarized major points (a) yes
48. he stated objectives for each class session (a) yes
49. he discussed practical applications (a) yes
50. avoided excessive mathematical details (a) yes
51. Any other outstanding positive qualities? Mark block (a) if yes, and specify on the reverse side of answer sheet (a) yes

52. The course presented facts and concepts from related fields -

(a) most of the time
(b) some of the time
(c) very infrequently
(d) never
(f) no answer (i.e. leave blank)

53. In reference to question 51, I prefer -

(a) much more
(b) more
(c) about right
(d) less
(e) much less
(f) no answer

54. The lecturer related class topics to students' lives and concerns, and more generally to the outside world -

(a) as often as possible
(b) a lot of the time
(c) some of the time
(d) very infrequently
(e) never
(f) no answer

55. In reference to question 53, I prefer -

(a) much more
(b) more
(c) about right
(d) less
(e) much less
(f) no answer

56. Due to my taking this course, my mastery of the subject matter and of the relevant skills and methods

(a) have improved greatly
(b) have improved somewhat
(c) have remained constant
(d) have decreased somewhat due to confusion created by the course
(e) have decreased a great deal
(f) no answer

57. Do you think this Questionnaire asked the right questions? If yes, mark (a) If not, mark (b) and specify on the reverse side of answer sheet. -

(a) yes
(b) no (specify on the reverse side of answer sheet.)
(f) I prefer not to answer

58. Please discuss on the back of the answer sheet anything you particularly liked about the course or particularly disliked. - Did you make such a comment?

(a) yes
(f) no (i.e. leave blank)

59. Your class is -

(a) freshman	(b) sophomore	(c) junior
(d) senior	(e) graduate or special student	(f) I prefer not to answer

60. Your major is in the area of -

(a) engineering
(b) premed or life sciences
(c) mathematics
(d) chemistry
(e) Other (mark here, and specify on the reverse side of the sheet)
(f) I prefer not to answer

61. How many hours of work outside class did you put in on this course? (exclude hours related specifically to lab). -

(a) between 0 and 2 hours per week
(b) between 2 and 4 hours per week
(c) between 4 and 6 hours per week
(d) between 6 and 8 hours per week
(e) over 8 hours per week
(f) I prefer not to answer

62. In the course do you expect to get -

(a) a good grade
(b) an average grade
(c) a poor grade
(f) I prefer not to answer (i.e. leave blank)

63. How many classes of this instructor have you missed -

(a) none	(b) very few	(c) few
(d) many	(e) nearly all	(f) I prefer not to answer

64. You are taking this course -

(a) to fulfill a General Education requirement
(b) to fulfill a requirement of my program
(c) elective, chosen because of my interest in the subject
(d) elective, chosen because I needed an easy course
(e) elective, chosen because I heard the course or professor was good
(f) I prefer not to answer

65. Of the courses that would have served my purpose, this one was -

(a) only choice that fulfilled my needs
(b) my first choice
(c) my second choice
(d) only course still open
(f) no answer (i.e. leave blank)

UNIVERSITY OF MARYLAND

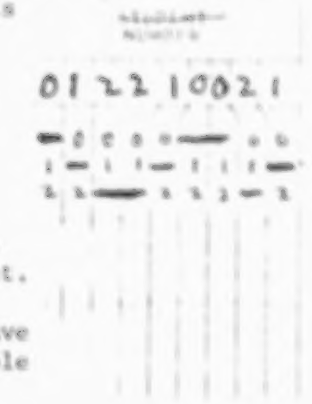
Physics Department

Teaching Questionnaire

Form 3 - "Physics" (or G.P.S.) Graduate or Undergraduate Courses (Lecturer)

The purpose of this questionnaire is to obtain in an anonymous fashion your opinion about the physics and astronomy teachers and courses. This information will be used in many ways — to improve each teacher's performance, to help the chairman assign faculty members to courses, and to provide important input in the evaluation of faculty with respect to retention and promotion.

Do not put your student number in the box labelled student number in the lower right hand corner of your answer sheet. Instead put the code number for this course (which should be on the blackboard) in that nine digit space by blocking in the appropriate blocks, e.g. Code Number 012210021 would become:



Your instructor will get the tabulated results of this questionnaire, together with any written comments, after the final grades in this course have been submitted.

General Instructions

1. All entries must be on the STANDARD ANSWER SHEET. Comments must be written on the back of this sheet.

2. Use a Number 2 pencil only. Each question must have either one block only or no block marked. Multiple answers are not allowed, so that a wrong answer must be erased carefully and completely. To mark the response (f) leave all spaces blank. This will be counted.

3. Black in your course code number in the nine digit space labelled "Student Number" on your Standard Answer Sheet.

4. Finally, please write on the top of the Standard Answer Sheet the course number; section number; name of the specific person whom you are evaluating; and whether this is a lab, recitation, or lecture; (e.g., "Phys 100, Section 201, John Doe, Lab.") This information should also be on the blackboard.

M.K. || Even if you do not fill out the questionnaire please carry out instructions 3 and 4, and return the otherwise blank answer sheet. Thank you for your cooperation. ||

Questions:

1. With regard to this questionnaire:

(a) You basically approve of such questionnaires, and hence you are responding to the whole questionnaire.
(b) You find such questionnaires an imposition, but in spite of this view, you are responding to the whole questionnaire.
(f) (i.e. leave blank) You disapprove of such questionnaires, and hence (PLEASE, after filling in the code number) intend to abstain completely.

2. I evaluate the lecturer's knowledge of the subject as being -

(a) excellent (b) good (c) satisfactory
(d) less than satisfactory (e) incompetent
(f) no answer

3. His ability to get the material across to me is -

(a) excellent (b) good (c) satisfactory
(d) poor (e) zero (f) no answer

4. His preparation for class is -

(a) poor (b) satisfactory (c) good
(d) less than satisfactory (e) excellent (f) no answer

5. The lecturer -

(a) usually started and ended his class on time
(b) sometimes started late or ended late
(c) frequently started late or ended late
(d) frequently started late and also ran over
(e) often calls off class or doesn't show up
(f) no answer

6. The course as a whole was planned and organized -

(a) extremely well (b) well (c) acceptably
(d) rather poorly (e) extremely poorly (f) no answer

7. In my opinion the inclusion in the course of lecture demonstrations, films, and visual aids was -

(a) too much (b) good (c) adequate
(d) not enough (e) too little (f) no answer

8. The lecturer -

(a) seldom made the underlying physical ideas clear
(b) never made the underlying physical ideas clear
(c) usually made the underlying physical ideas clear
(d) always made the underlying physical ideas clear
(f) no answer (i.e. leave blank)

9. The lecturer's ability to make the subject interesting -

(a) excellent (b) good (c) satisfactory (d) poor
(e) zero (f) no answer

10. The lecturer's apparent concern in teaching this class showed that he was -

(a) exceedingly interested
(b) usually quite interested
(c) fairly interested
(d) only occasionally interested
(e) bored
(f) no answer

11. His attitude toward questions in class was -

(a) very encouraging (b) usually encouraging (c) adequately receptive
(d) flippant (e) discouraging (f) I have no opinion

12. From my experience, the teacher's availability for questions outside of class hours was -

(a) encouraging and generous of his time
(b) usually available
(c) barely adequate
(d) discouraging and usually unavailable
(e) always unavailable
(f) I have no opinion

13. The feeling between the lecturer and the students was -

(a) that of strong good will
(b) that of good will
(c) neutral
(d) negative
(e) antagonistic
(f) no answer

14. Does the lecturer make the distinction between the important points of the subject and incidental information -

(a) yes, he always makes that distinction very clearly
(b) he makes that distinction clear in most instances
(c) sometimes he does, sometimes he doesn't
(d) for the most part such a distinction is not made
(e) never
(f) no answer

15. The exams -

(a) always covered material or techniques emphasized in the course
(b) usually covered material or techniques emphasized in the course
(c) sometimes covered material or techniques emphasized in the course
(d) frequently covered material not emphasized in the course
(e) were totally unrelated to the course
(f) no answer

16. The exams and grading in the course were -

(a) much too easy; easy to get good grade without adequate understanding
(b) a little too easy
(c) very fair
(d) somewhat too difficult to get a good grade
(e) much too hard
(f) no answer

17. The assignments in the course were -

(a) much too hard or much too long
(b) generally somewhat too difficult or somewhat too long
(c) about right for the course
(d) not quite adequate
(e) non-existent or grossly inadequate
(f) no answer

18. The problems and/or questions assigned were -

(a) very helpful in understanding the material
(b) helpful in understanding the material
(c) somewhat helpful in understanding the material
(d) generally not well selected
(e) poorly selected
(f) no answer

19. The text(s), handouts, readings, etc. were -

(a) excellent
(b) good
(c) satisfactory
(d) less than satisfactory
(e) poor
(f) no answer

20. The grading and commentary on the homework was -

(a) carefully done and helpful
(b) adequately done
(c) less than satisfactory
(d) arbitrary and unfair
(e) not done
(f) no answer

21. If you were to take another physics course at approximately the same level in which this person were teaching, you would -

    (a) eagerly seek his section out
    (b) take his section if convenient
    (c) have no strong feelings
    (d) avoid his section if easily possible
    (e) avoid him like the plague
    (f) no answer

22. On the basis of this person's teaching in this course I think that he -

    (a) merits appropriate recognition for his truly outstanding teaching
    (b) is a good teacher
    (c) has the potential of becoming a good teacher
    (d) is an adequate teacher, but without much potential
    (e) should not be retained as a teacher in this course
    (f) no answer

23. The math and/or physics background implied by the prerequisite of this course was -

    (a) sufficient to handle the course
    (b) inadequate, but the instructor filled in the gaps
    (c) inadequate and further, the instructor failed to fill in the gaps
    (d) greater than needed
    (e) poorly related to the course
    (f) I don't know the official prerequisite

24. In my opinion the general level and speed of the course were -

    (a) much too hard and/or much too fast
    (b) somewhat too hard and/or somewhat too fast
    (c) just right
    (d) a little too easy and/or a little too slow
    (e) much too easy and trivial
    (f) no answer

25. His use of examples and illustrations was -

    (a) excellent and effective
    (b) good
    (c) adequate and helpful
    (d) less than satisfactory
    (e) noticeably lacking
    (f) no answer

For each of the following possible bad habits, mark block (a) if and only if the instructor suffers from it, and it would be desirable for him to correct it; otherwise make no mark -

26. Inaudible	(a) should be corrected
27. writing was illegible	(a) should be corrected
28. spoke either too fast or too slow	(a) should be corrected
29. monotonous style of speaking	(a) should be corrected
30. poor organization on blackboard	(a) should be corrected
31. lectured to the blackboard	(a) should be corrected
32. paced too much	(a) should be corrected
33. "hums" and "haws"	(a) should be corrected
34. distracting or nervous mannerisms	(a) should be corrected
35. caustic or sarcastic manner	(a) should be corrected
36. any other bad habits? Mark (a) if "yes", and specify on the reverse side of answer sheet	(a) yes

For each of the following positive qualities, mark block (a) if the instructor has it to a high degree -

37. is articulate (a) yes
38. has excellent organization on blackboard (a) yes
39. has very well paced lectures (a) yes
40. has a lively style of speaking (a) yes
41. has cheerful or pleasant disposition (a) yes
42. speaks directly to the class (a) yes
43. has a sense of humor when called for (a) yes
44. he motivated me to do my best work (a) yes

45. he discussed his actions, decisions, and selection of topics (a) yes

46. he made difficult topics easier to understand (a) yes
47. he summarized major points (a) yes
48. he stated objectives for each class session (a) yes
49. he discussed practical applications (a) yes
50. avoided excessive mathematical details (a) yes
51. Any other outstanding positive qualities? Mark block (a) if yes, and specify on the reverse side of answer sheet (a) yes

52. Do you think this Questionnaire asked the right questions? If "yes", mark (a). If not, mark (b) and specify on the reverse side of answer sheet. -

(a) yes
(b) no (mark (b) and specify on the reverse side of answer sheet).
(f) I prefer not to answer.

53. Please discuss on the back of the answer sheet anything you particularly liked about the course or particularly disliked. Did - - - - - - - -
See 1.58

54. Your class is -

(a) freshman or first year graduate
(b) sophomore or second year graduate
(c) junior or third or higher year graduate student
(d) senior
(e) special student
(f) I prefer not to answer

55. Your major is in the area of -

(a) physics or astronomy
(b) engineering
(c) life sciences or premed
(d) mathematics
(e) other (mark here, and specify on the reverse side of the sheet)
(f) I prefer not to answer

56. How many hours of work outside class did you put in on this course? (exclude hours related specifically to lab) -

(a) between 0 and 2 hours per week
(b) between 2 and 4 hours per week
(c) between 4 and 6 hours per week
(d) between 6 and 8 hours per week
(e) over 8 hours per week
(f) I prefer not to answer

57. In the course do you expect to get -

(a) a good grade
(b) an average grade
(c) a poor grade
(f) I prefer not answer (i.e. leave blank)

58. How many classes of this instructor have you missed -

(a) none (b) very few (c) few (d) many
(e) nearly all (f) I prefer not to answer

59. You are taking this course -

(a) to fulfill a General Education requirement
(b) to fulfill a requirement of my program
(c) elective, chosen because of my interest in the subject
(d) elective, chosen because I needed an easy course
(e) elective, chosen because I heard the course or professor was good
(f) I prefer not to answer

60. Of the courses that would have served my purpose, this one was -

(a) only choice that fulfilled my needs
(b) my first choice
(c) my second choice
(d) only course still open
(f) no answer (i.e. leave blank)

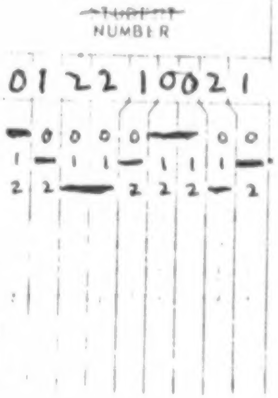
UNIVERSITY OF MARYLAND
Physics Department
Teaching Questionnaire

Form 4 - Recitation Sections

All questions refer to the recitation, and to the recitation T/A or instructor.

The purpose of this questionnaire is to obtain in an anonymous fashion your opinion about the physics and astronomy teachers and courses. This information will be used in many ways — to improve each teacher's performance, to help the chairman assign faculty members to courses, and to provide important input in the evaluation of faculty with respect to retention and promotion.

Do not put your student number in the box labelled student number in the lower right hand corner of your answer sheet. Instead put the code number for this course (which should be on the blackboard) in that nine digit space by blocking in the appropriate blocks, e.g. Code Number 012210021 would become:



Your instructor will get the tabulated results of this questionnaire, together with any written comments, after the final grades in this course have been submitted.

General Instructions

1. All entries must be on the STANDARD ANSWER SHEET. Comments must be written on the back of this sheet.

2. Use a Number 2 pencil only. Each question must have either one block only or no block marked. Multiple answers are not allowed, so that a wrong answer must be erased carefully and completely. To mark the response (f) leave all spaces blank. This will be counted.

3. Black in your course code number in the nine digit space labelled "Student Number" on your Standard Answer Sheet.

4. Finally, please write on the top of the Standard Answer Sheet the course number; section number; name of the specific person whom you are evaluating; and whether this is a lab, recitation, or lecture; (e.g., "Phys 100, Section 201, John Doe, Lab.") This information should also be on the blackboard.

M.Y. Even if you do not fill out the questionnaire please carry out instructions 3 and 4, and return the otherwise blank answer sheet. Thank you for your cooperation.

Questions:

1. With regard to this questionnaire:

(a) You basically approve of such questionnaires, and hence you are responding to the whole questionnaire.
(b) You find such questionnaires an imposition, but in spite of this view, you are responding to the whole questionnaire.
(f) (i.e. leave blank) You disapprove of such questionnaires, and hence
(PLEASE, after filling in the code number) intend to abstain completely.

2. I evaluate the lecturer's knowledge of the subject as being -

(a) excellent (b) good (c) satisfactory
(d) less than satisfactory (e) incompetent
(f) no answer

3. His ability to get the material across to me is -

(a) excellent (b) good (c) satisfactory
(d) poor (e) zero (f) no answer

4. His preparation for class is -

(a) Poor (b) satisfactory (c) good
(d) less than satisfactory (e) excellent (f) no answer

5. The teacher -

(a) usually started and ended his class on time
(b) sometimes started late or ended late
(c) frequently started late or ended late
(d) frequently started late and also ran over
(e) often calls off class or doesn't show up
(f) no answer

6. The teacher related the recitation class to the lectures, assignments and exams -

(a) extremely well (b) better than average
(c) average (d) rather poorly
(e) extremely poorly (f) no answer

7. The teacher's ability to make the subject interesting was -

(a) excellent (b) good (c) satisfactory (d) poor
(e) zero (f) no answer

8. The teacher's apparent concern in teaching this class showed that he was -

(a) usually quite interested
(b) only occasionally interested
(c) fairly interested
(d) bored
(e) exceedingly interested
(f) no answer

9. His attitude toward questions in class was -

(a) very encouraging (b) usually encouraging
(c) adequately receptive (d) flippant
(e) discouraging (f) I have no opinion

10 From my experience, the teacher's availability for questions outside of class hours was -

(a) encouraging and generous of his time
(b) usually available
(c) barely adequate
(d) discouraging and usually unavailable
(e) always unavailable
(f) I have no opinion

11. The feeling between the teacher and the students was -

    (a) that of strong good will
    (b) that of good will
    (c) neutral
    (d) negative
    (e) antagonistic
    (f) no answer

12. In discussing homework or exam problems the teacher -

    (a) always makes the underlying physical ideas clear
    (b) usually makes the underlying physical ideas clear
    (c) seldom makes the underlying physical ideas clear
    (d) never makes the underlying physical ideas clear
    (f) no answer (i.e. leave blank)

13. The teacher's attempts to answer questions about the lecture was -

    (a) very clear and to the point
    (b) often clear and helpful
    (c) usually satisfactory
    (d) less than satisfactory
    (e) generally unsuccessful
    (f) no answer

14. Class participation -

    (a) effectively involved everyone
    (b) involved many people
    (c) involved only a few people
    (d) rarely involved anyone
    (e) was totally lacking
    (f) no answer

15. If you were to take another physics course in which this person was teaching, you would -

    (a) eagerly seek his section out
    (b) take his section if convenient
    (c) have no strong feelings
    (d) avoid his section if easily possible
    (e) avoid him like the plague
    (f) no answer

16. On the basis of this person's teaching in this course, I think that he -

    (a) is an outstanding teacher
    (b) is a good teacher
    (c) has the potential of becoming a good teacher
    (d) is an adequate teacher, but without much potential
    (e) should not be retained as a teacher
    (f) no answer

17. His use of examples and illustrations was -

    (a) excellent and effective
    (b) good
    (c) adequate and helpful
    (d) less than satisfactory
    (e) noticeably lacking
    (f) no answer

For each of the following possible bad habits, mark block (a) if and only if the instructor suffers from it, and it would be desirable for him to correct it; otherwise make no mark -

18. inaudible	(a) should be corrected
19. writing is illegible	(a) should be corrected
20. speaks too fast	(a) should be corrected
21. speaks too slow	(a) should be corrected
22. poor organization on blackboard	(a) should be corrected
23. talks to the blackboard	(a) should be corrected
24. "hums" and "haws"	(a) should be corrected
25. distracting or nervous mannerisms	(a) should be corrected
26. any other bad habits? Mark (a) if "yes", and specify on the reverse side of answer sheet	(a) yes

For each of the following positive qualities, mark block (a) if the instructor has it to a high degree -

27. is articulate (a) yes
28. has excellent organization of the blackboard (a) yes
29. has a cheerful or pleasant disposition (a) yes
30. speaks directly to the class (a) yes

31. has a sense of sense of humor when called for (a) yes
32. is very honest when he has made a mistake or does not know the answer (a) yes
33. avoids excessive mathematical detail (a) yes
34. Any other outstanding positive qualities? Mark block (a) if yes, and specify on the reverse side of answer sheet (a) yes

35. Do you think this Questionnaire asked the right questions? If yes, mark (a). If not, mark (b) and specify on the reverse of answer sheet. -

(a) yes
(b) no (mark (b) and specify on the reverse side of answer sheet).
(f) I prefer not to answer.

36. Please discuss on the back of the answer sheet anything you particularly liked about the course or particularly disliked. - See 1.58

37. Your class is -

(a) freshman
(b) sophomore
(c) junior
(d) senior
(e) graduate or special student
(f) I prefer not to answer

38. Your major is in the area of -

(a) engineering
(b) premed or life sciences
(c) mathematics
(d) chemistry
(e) other (mark here, and specify on the reverse side of the sheet)
(f) I prefer not to answer

39. In the course do you expect to get

(a) a good grade (b) an average grade
(c) a poor grade (d) I prefer not to answer (i.e. leave blank)

40. How many classes of this instructor have you missed -

(a) none (b) very few (c) few
(d) many (e) nearly all (f) I prefer not to answer

41. You are taking this course -

(a) to fulfill a General Education requirement
(b) to fulfill a requirement of my program
(c) elective, chosen because of my interest in the subject
(d) elective, chosen because I needed an easy course
(e) elective, chosen because I heard the course or professor was good
(f) no reply

42. Of the courses that would have served my purpose, this one was -

(a) only choice that fulfilled my needs
(b) my first choice
(c) my second choice
(d) only course still open
(f) no reply (i.e. leave blank)

UNIVERSITY OF MARYLAND

Physics Department

Teaching Questionnaire

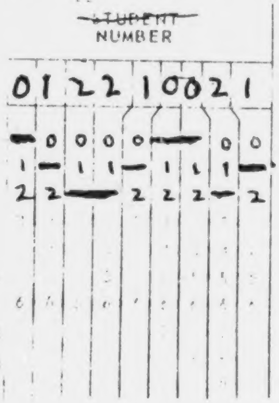
Form 3 - "Structured" Laboratory Sections or Courses

All Questions Refer to the Laboratory

The purpose of this questionnaire is to obtain in an anonymous fashion your opinion about the physics and astronomy teachers and courses. This information will be used in many ways — to improve each teacher's performance, to help the chairman assign faculty members to courses, and to provide important input in the evaluation of faculty with respect to retention and promotion.

Do not put your student number in the box labelled student number in the lower right hand corner of your answer sheet. Instead put the code number for this course (which should be on the blackboard) in that nine digit space by blocking in the appropriate blocks, e.g. Code Number 012210021 would become:

Your instructor will get the tabulated results of this questionnaire, together with any written comments, after the final grades in this course have been submitted.



General Instructions

1. All entries must be on the STANDARD ANSWER SHEET. Comments must be written on the back of this sheet.

2. Use a Number 2 pencil only. Each question must have either one block only or no block marked. Multiple answers are not allowed, so that a wrong answer must be erased carefully and completely. To mark the response (f) leave all spaces blank. This will be counted.

3. Black in your course code number in the nine digit space labelled "Student Number" on your Standard Answer Sheet.

4. Finally, please write on the top of the Standard Answer Sheet the course number; section number; name of the specific person whom you are evaluating; and whether this is a lab, recitation, or lecture; (e.g., "Phys 100, Section 201, John Doe, Lab.") This information should also be on the blackboard.

Even if you do not fill out the questionnaire please carry out instructions 3 and 4, and return the otherwise blank answer sheet. Thank you for your cooperation.

Questions:

1. With regard to this questionnaire:

   (a) You basically approve of such questionnaires, and hence you are responding to the whole questionnaire.
   (b) You find such questionnaires an imposition, but in spite of this view, you are responding to the whole questionnaire.
   (f) (i.e. leave blank) You disapprove of such questionnaires, and hence (PLEASE, after filling in the code number) intend to abstain completely.

2. The instructor's familiarity with the equipment was -

   (a) excellent (b) good (c) adequate
   (d) weak (e) noticeably lacking (f) no answer

3. The instructor's knowledge of the physics of the experiment was -

   (a) excellent (b) good (c) adequate
   (d) weak (e) noticeably lacking (f) no answer

4. In the laboratory the instructor -

   (a) refuses to help students
   (b) tends to spend his time with a few people
   (c) was adequately helpful
   (d) was present, but largely ignored the laboratory
   (e) circulates and is very helpful
   (f) frequently leaves the laboratory

5. Grading and comments on laboratory reports were -

   (a) carefully done and helpful
   (b) adequately done
   (c) less than satisfactory
   (d) arbitrary and unfair
   (e) not done
   (f) no answer

6. The instructor's apparent concern in teaching this class shows that he was -

   (a) exceedingly interested
   (b) usually quite interested
   (c) fairly interested
   (d) only occasionally interested
   (e) bored
   (f) no answer

7. The feeling between the instructor and the students was -

   (a) that of strong good will (b) that of good will
   (c) neutral (d) negative
   (e) antagonistic (f) no answer

8. The experiments were -

   (a) adequately coordinated with the lecture
   (b) unrelated to the lecture
   (c) poorly coordinated with the lecture
   (d) no lecture - so inapplicable
   (e) well coordinated with the lecture
   (f) no answer

9. The experiments were -

   (a) interesting and informative
   (b) fairly interesting but not well developed
   (c) dull
   (d) much too detailed so that one lost the forest for the trees
   (e) some good, some bad
   (f) no answer

10. The laboratory manual or handouts were -

(a) very clear and helpful
(b) generally good
(c) adequate
(d) less than adequate
(e) generally useless
(f) no answer

11. If you were to take another physics course in which this person was teaching, you would

(a) eagerly seek his section out
(b) take his section if convenient
(c) have no strong feelings
(d) avoid his section if easily possible
(e) avoid him like the plague

12. Do you think this Questionnaire asked the right questions? If "yes", mark (a). If not, mark (b) and specify on the reverse side of answer sheet.

(a) yes
(b) no (mark (b) and specify on the reverse side of answer sheet).
(f) I prefer not to answer.

13. Please discuss on the back of the answer sheet anything you particularly liked about the course or particularly disliked. See 1.58

14. Your class is -

(a) freshman or first year graduate
(b) sophomore or second year graduate
(c) junior or third or higher year graduate student
(d) senior
(e) special student
(f) I prefer not to answer

15. Your major is in the area of -

(a) physics or astronomy
(b) engineering
(c) life sciences or premed
(d) mathematics
(e) other (mark here, and specify on the reverse side of the sheet)
(f) I prefer not to answer

16. How many hours of work outside the lab period did you put in on work specifically related to lab? -

(a) none
(b) between 0 and 1 hour per week
(c) between 1 and 3 hours per week
(d) between 3 and 6 hours per week
(e) more than 6 hours per week
(f) I prefer not to answer

17. In the course do you expect to get -

(a) a good grade (b) an average grade
(c) a poor grade (f) I prefer not to answer (i.e. leave blank)

18. How many classes of this instructor have you missed -

(a) none (b) very few (c) few
(d) many (e) nearly all (f) I prefer not to answer

19. You are taking this course -

(a) to fulfill a General Education requirement
(b) to fulfill a requirement of my program
(c) elective, chosen because of my interest in the subject
(d) elective, chosen because I needed an easy course
(e) elective, chosen because I heard the course or professor was good
(f) no reply

20. Of the courses that would have served my purpose, this one was -

(a) only choice that fulfilled my needs
(b) my first choice
(c) my second choice
(d) only course still open
(f) no reply (i.e. leave blank)

UNIVERSITY OF MARYLAND

Physics Department

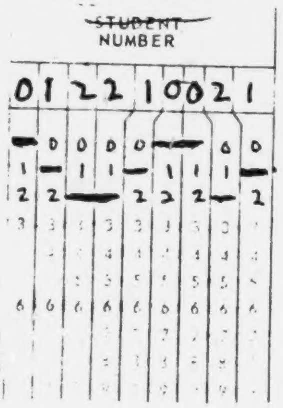
Teaching Questionnaire

Form 6 - "Unstructured Laboratory Courses"

All Questions Refer to the Laboratory

The purpose of this questionnaire is to obtain in an anonymous fashion your opinion about the physics and astronomy teachers and courses. This information will be used in many ways — to improve each teacher's performance, to help the chairman assign faculty members to courses, and to provide important input in the evaluation of faculty with respect to retention and promotion.

Do not put your student number in the box labelled student number in the lower right hand corner of your answer sheet. Instead put the code number for this course (which should be on the blackboard) in that nine digit space by blocking in the appropriate blocks, e.g. Code Number 012210021 would become:



Your instructor will get the tabulated results of this questionnaire, together with any written comments, after the final grades in this course have been submitted.

General Instructions

1. All entries must be on the STANDARD ANSWER SHEET. Comments must be written on the back of this sheet.
2. Use a Number 2 pencil only. Each question must have either one block only or no block marked. Multiple answers are not allowed, so that a wrong answer must be erased carefully and completely. To mark the response (f) leave all spaces blank. This will be counted.
3. Black in your course code number in the nine digit space labelled "Student Number" on your Standard Answer Sheet.
4. Finally, please write on the top of the Standard Answer Sheet the course number; section number; name of the specific person whom you are evaluating; and whether this is a lab, recitation, or lecture; (e.g., "Phys 100, Section 201, John Doe, Lab.") This information should also be on the blackboard.

Even if you do not fill out the questionnaire please carry out instructions 3 and 4, and return the otherwise blank answer sheet. Thank you for your cooperation.

Questions:

1. With regard to this questionnaire:

   (a) You basically approve of such questionnaires, and hence you are responding to the whole questionnaire.
   (b) You find such questionnaires an imposition, but in spite of this view, you are responding to the whole questionnaire.
   (f) (i.e. leave blank) You disapprove of such questionnaires, and hence (PLEASE, after filling in the code number) intend to abstain completely.

> IMPORTANT — When evaluating the laboratory teaching assistant, answer only the starred questions.

2. Equipment for experiments was

   (a) adequate
   (b) inadequate
   (f) no answer (i.e., leave blank)

3. Equipment for experiments was

   (a) adequately documented or explained
   (b) inadequately documented or explained
   (f) no answer (i.e., leave blank)

*4. The instructor's preparation for class was

   (a) poor (b) satisfactory (c) good
   (d) less than satisfactory (e) thorough (f) no answer

*5. The instructor's knowledge of the physics in the experiment was

   (a) excellent (b) good (c) adequate
   (d) weak (e) noticeably lacking (f) no answer

*6. In the laboratory the instructor

   (a) was always available and willing to help
   (b) was adequately helpful
   (c) was present, but largely ignored the laboratory
   (d) refused to help students
   (e) frequently left the laboratory
   (f) no answer

*7. When I had questions about the equipment, the instructor

   (a) was able to help me or direct me to someone with expert knowledge
   (b) showed less than adequate concern or interest
   (c) ignored my pleas for help
   (f) no answer (i.e., leave blank)

*8. The instructor's apparent concern in teaching this class showed that he was

   (a) usually quite concerned
   (b) only occasionally interested
   (c) fairly interested
   (d) bored
   (e) exceedingly interested
   (f) no answer

*9. His ability to get the material across to me is

   (a) excellent (b) good (c) satisfactory
   (d) poor (e) zero (f) no answer

*10. The feeling between the instructor and the students was

   (a) that of strong goodwill (b) that of goodwill (c) neutral
   (d) negative (e) antagonistic (f) no answer

*11. His attitude toward questions in class was

(a) very encouraging (b) usually encouraging (c) adequately receptive
(d) flippant (e) discouraging (f) no answer

12. Grading and comments written on laboratory reports were

(a) carefully done and helpful
(b) adequately done
(c) less than satisfactory
(d) arbitrary and unfair
(e) not done
(f) no answer

*13. Comments and criticisms during oral laboratory reports were

(a) carefully done and helpful
(b) adequately done
(c) less than satisfactory
(d) arbitrary and unfair
(e) not made
(f) no answer

14. Class presentations by the instructor were

(a) worth the time they took
(b) interesting, but the time required could have been better spent working in the laboratory
(c) of little value
(f) no answer

15. The lecturer's ability to make class presentations interesting was

(a) excellent (b) good (c) satisfactory (d) poor (e) zero
(f) no answer

16. The teacher's attempts to answer questions about the lecture were

(a) very clear and to the point
(b) often clear and helpful
(c) usually satisfactory
(d) less than satisfactory
(e) generally unsuccessful
(f) no answer

17. Class participation

(a) effectively involved everyone
(b) involved many people
(c) involved only a few people
(d) rarely involved anyone
(e) was totally lacking
(f) no answer

*18. If you were to take another physics course in which this person was teaching, you would

(a) eagerly seek his section out
(b) take his section if convenient
(c) have no strong feelings
(d) avoid his section if easily possible
(e) avoid him like the plague

*19. On the basis of this person's teaching in this course, I think that he

(a) is an outstanding teacher
(b) is a good teacher
(c) has the potential of becoming a good teacher
(d) is an adequate teacher, but without much potential
(e) should not be retained as a teacher
(f) no answer

For each of the following possible bad habits, mark block (a) if and only if the instructor suffers from it, and it would be desirable for him to correct it; otherwise make no mark

20. inaudible (a) should be corrected
21. writing is illegible (a) should be corrected
22. speaks too fast (a) should be corrected
23. speaks too slow (a) should be corrected
24. poor organization on blackboard (a) should be corrected
25. talks to the blackboard (a) should be corrected
26. "hums" and "haws" (a) should be corrected
27. distracting or nervous mannerisms (a) should be corrected
28. any other bad habits? Mark (a) if "yes," and specify on the reverse side of the answer sheet (a) yes

For each of the following positive qualities, mark block (a) if the instructor has it to a high degree

29. is articulate (a) yes
30. has excellent organization of the blackboard (a) yes
31. has a cheerful or pleasant disposition (a) yes
32. speaks directly to the class (a) yes
33. has a sense of humor when called for (a) yes
34. is very honest when he has made a mistake or does not know the answer (a) yes
35. avoids excessive mathematical detail (a) yes
36. Any other outstanding positive qualities? Mark block (a) if yes, and specify on the reverse side of answer sheet (a) yes

37. Lecture presentations by students enrolled in the course:

(a) should be continued
(b) should not be required
(c) should be continued with a different format [mark block (c) and specify on reverse side of answer sheet
(f) no answer

38. Lecture presentations by students enrolled in the course:

(a) were worth the time they took
(b) were interesting, but the time required could have been better spent working in the laboratory
(c) were of little value
(f) no answer

39. I personally found that the time I spent in preparing my own talk and the experience of presenting it were

(a) worthwhile
(b) of marginal value
(f) no answer

40. I found that the effort spent on this course was

(a) excessive for the amount of credit given
(b) more than that spent on other courses of equivalent credit
(c) about the same as that spent on other courses of equivalent credit
(d) less than that spent on other equivalent courses

41. Due to my taking this course, my mastery of the subject matter and of the relevant skills and methods

(a) has improved greatly
(b) has improved somewhat
(c) has remained constant
(d) has decreased somewhat due to confusion created by the course
(e) has decreased a great deal
(f) no answer

42. The course as a whole was planned and organized

(a) extremely well (b) better than average
(c) about as well as the average course (d) rather poorly
(e) extremely poorly (f) no answer

43. Disregarding the amount of effort involved (as discussed in question 40), I feel that the experience gained in this laboratory

(a) was of great value (d) was of no value
(b) was worthwhile (f) no answer (i.e., leave blank)
(c) was of marginal value

44. How many hours per week in total did you spend on this course?

(a) 4-8 (e) over 20
(b) 8-12 (f) I prefer not to answer
(c) 12-16
(d) 16-20

45. All things considered, I feel that what is expected of the student in this course

(a) is reasonable and should be left unchanged
(b) is somewhat excessive, and should be slightly reduced
(c) is greatly excessive
(f) no answer (leave blank)

46. What grade do you expect to receive in this course?

(a) A
(b) B
(c) C
(d) D
(e) F
(f) I prefer not to answer

47. Your class is

(a) senior
(b) first year graduate
(c) second year graduate
(d) third or higher year graduate
(e) special student
(f) I prefer not to answer

48. Specialization: Before I took this course:

(a) I planned to be an experimentalist if possible
(b) I planned to be a theorist if possible
(c) I was undecided
(f) I prefer not to answer (i.e., leave blank)

49. Due to my taking this course, my attitude towards experimental work has

(a) become more favorable
(b) remained unchanged
(c) become less favorable
(d) I prefer not to answer (i.e., leave blank)

50. Should this course remain a required graduate course?

(a) yes, but only for experimentalists
(b) yes, but only for theorists
(c) yes
(d) no

51. Do you think this Questionnaire has asked the right questions? If yes, mark (a). If not, mark (b) and specify on the reverse side of the answer sheet.

    (a) yes
    (b) no (mark (b) and specify on the reverse side of the answer sheet.
    (f) I prefer not to answer.

52. Please discuss on the back of the answer sheet anything you particularly liked about the course or particularly disliked. Suggestions for improvement, change in format, or emphasis, etc. would be appreciated. Did you make such a comment?

    (a) yes
    (f) no (i.e. leave blank)

UNIVERSITY OF MARYLAND

Physics Department

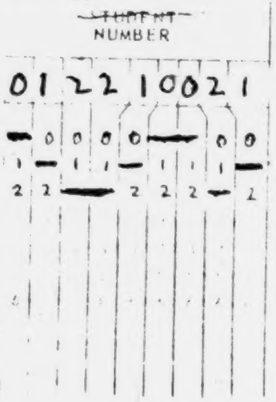
Teaching Questionnaire

Form 7 - Laboratory Course

All Questions Refer to the Laboratory

The purpose of this questionnaire is to obtain in an anonymous fashion your opinion about the physics and astronomy teachers and courses. This information will be used in many ways — to improve each teacher's performance, to help the chairman assign faculty members to courses, and to provide important input in the evaluation of faculty with respect to retention and promotion.

Do not put your student number in the box labelled student number in the lower right hand corner of your answer sheet. Instead put the code number for this course (which should be on the blackboard) in that nine digit space by blocking in the appropriate blocks, e.g. Code Number 012210021 would become:



Your instructor will get the tabulated results of this questionnaire, together with any written comments, after the final grades in this course have been submitted.

General Instructions

1. All entries must be on the STANDARD ANSWER SHEET. Comments must be written on the back of this sheet.

2. Use a Number 2 pencil only. Each question must have either one block only or no block marked. Multiple answers are not allowed, so that a wrong answer must be erased carefully and completely. To mark the response (f) leave all spaces blank. This will be counted.

3. Black in your course code number in the nine digit space labelled "Student Number" on your Standard Answer Sheet.

4. Finally, please write on the top of the Standard Answer Sheet the course number; section number; name of the specific person whom you are evaluating; and whether this is a lab, recitation, or lecture; (e.g., "Phys 100, Section 201, John Doe, Lab.") This information should also be on the blackboard.

8. Even if you do not fill out the questionnaire please carry out instructions 3 and 4, and return the otherwise blank answer sheet. Thank you for your cooperation.

5. When evaluating the laboratory Teaching Assistant, answer only the starred questions

Questions:

1. With regard to this questionnaire:

   (a) You basically approve of such questionnaires, and hence you are responding to the whole questionnaire.
   (b) You find such questionnaires an imposition, but in spite of this view, you are responding to the whole questionnaire.
   (f) (i.e. leave blank) You disapprove of such questionnaires and hence (PLEASE, after filling in the code number) intend to abstain completely.

2. The experiments were -

   (a) interesting and informative
   (b) fairly interesting but not well developed
   (c) dull
   (d) much too detailed so that one lost the forest for the trees
   (e) some good, some bad
   (f) no answer

3. The laboratory manual or handouts were -

   (a) very clear and helpful
   (b) generally good
   (c) adequate
   (d) less than adequate
   (e) generally useless
   (f) no answer

*4. The instructor's preparation for class was

   (a) poor (b) satisfactory (c) good
   (d) less than satisfactory (e) thorough (f) no answer

*5. The instructor's knowledge of the physics in the experiment was

   (a) excellent (b) good (c) adequate
   (d) weak (e) noticeably lacking (f) no answer

*6. In the laboratory the instructor

   (a) was always available and willing to help
   (b) was adequately helpful
   (c) was present, but largely ignored the laboratory
   (d) refused to help students
   (e) frequently left the laboratory
   (f) no answer

*7. When I had questions about the equipment, the instructor

   (a) was able to help me or direct me to someone with expert knowledge
   (b) showed less than adequate concern or interest
   (c) ignored my pleas for help
   (f) no answer (i.e., leave blank)

*8. The instructor's apparent concern in teaching this class showed that he was

   (a) usually quite concerned
   (b) only occasionally interested
   (c) fairly interested
   (d) bored
   (e) exceedingly interested
   (f) no answer

*9. His ability to get the material across to me is

   (a) excellent (b) good (c) satisfactory
   (d) poor (e) zero (f) no answer

*10. The feeling between the instructor and the students was

   (a) that of strong goodwill (b) that of goodwill (c) neutral
   (d) negative (e) antagonistic (f) no answer

*11. His attitude toward questions in class was

(a) very encouraging (b) usually encouraging (c) adequately receptive
(d) flippant (e) discouraging (f) no answer

*12. Grading and comments written on laboratory reports were

(a) carefully done and helpful
(b) adequately done
(c) less than satisfactory
(d) arbitrary and unfair
(e) not done
(f) no answer

*13. Oral comments or criticisms during the laboratory period were

(a) Carefully done and helpful
(b) adequately done
(c) less than satisfactory
(d) arbitrary and unfair
(e) not made
(f) no answer

14. Class presentations by the instructor were

(a) worth the time they took
(b) interesting, but the time required could have been better spent working in the laboratory
(c) of little value
(f) no answer

15. The lecturer's ability to make class presentations interesting was

(a) excellent (b) good (c) satisfactory (d) poor (e) zero
(f) no answer

16. The teacher's attempts to answer questions about the lecture were

(a) very clear and to the point
(b) often clear and helpful
(c) usually satisfactory
(d) less than satisfactory
(e) generally unsuccessful
(f) no answer

17. Class participation

(a) effectively involved everyone
(b) involved many people
(c) involved only a few people.
(d) rarely involved anyone
(e) was totally lacking
(f) no answer

*18. If you were to take another physics course in which this person was teaching, you would

(a) eagerly seek his section out
(b) take his section if convenient
(c) have no strong feelings
(d) avoid his section if easily possible
(e) avoid him like the plague

*19. On the basis of this person's teaching in this course, I think that he

(a) is an outstanding teacher
(b) is a good teacher
(c) has the potential of becoming a good teacher
(d) is an adequate teacher, but without much potential
(e) should not be retained as a teacher
(f) no answer

For each of the following possible bad habits, mark block (a) if and only if the instructor suffers from it, and it would be desirable for him to correct it; otherwise make no mark

20. inaudible (a) should be corrected
21. writing is illegible (a) should be corrected
22. speaks too fast (a) should be corrected
23. speaks too slow (a) should be corrected
24. poor organization on blackboard (a) should be corrected
25. talks to the blackboard (a) should be corrected
26. "hums" and "haws" (a) should be corrected
27. distracting or nervous mannerisms (a) should be corrected
28. any other bad habits? Mark (a) if "yes," and specify on the reverse side of the answer sheet (a) yes

For each of the following positive qualities, mark block (a) if the instructor has it to a high degree

29. is articulate (a) yes
30. has excellent organization of the blackboard (a) yes
31. has a cheerful or pleasant disposition (a) yes
32. speaks directly to the class (a) yes
33. has a sense of humor when called for (a) yes
34. is very honest when he has made a mistake or does not know the answer (a) yes
35. avoids excessive mathematical detail (a) yes
36. Any other outstanding positive qualities? Mark block (a) if yes, and specify on the reverse side of answer sheet (a) yes

37. I found that the effort spent on this course was

(a) excessive for the amount of credit given
(b) more than that spent on other courses of equivalent credit
(c) about the same as that spent on other courses of equivalent credit
(d) less than that spent on other equivalent courses

38. Due to my taking this course, my mastery of the subject matter and of the relevant skills and methods

(a) has improved greatly
(b) has improved somewhat
(c) has remained constant
(d) has decreased somewhat due to confusion created by the course
(e) has decreased a great deal
(f) no answer

39. The course as a whole was planned and organized

(a) extremely well (b). better than average
(c) about as well as the average course (d) rather poorly
(e) extremely poorly (f) no answer

40. Disregarding the amount of effort involved (as discussed in question 40), I feel that the experience gained in this laboratory

(a) was of great value
(b) was worthwhile
(c) was of marginal value
(d) was of no value
(f) no answer (i.e., leave blank)

41. How many hours per week in total did you spend on this course?

(a) 4-8
(b) 8-12
(c) 12-16
(d) 16-20
(e) over 20
(f) I prefer not to answer

42. All things considered, I feel that what is expected of the student in this course

(a) is reasonable and should be left unchanged
(b) is somewhat excessive, and should be slightly reduced
(c) is greatly excessive
(f) no answer (leave blank)

43. What grade do you expect to receive in this course?

    (a) A
    (b) B
    (c) C
    (d) D
    (e) F
    (f) I prefer not to answer

44. Do you think this Questionnaire has asked the right questions? If yes, mark (a). If not, mark (b) and specify on the reverse side of the answer sheet.

    (a) yes
    (b) no (mark (b) and specify on the reverse side of the answer sheet.
    (f) possibility

45. Please discuss on the back of the answer sheet anything you particularly liked about the course or particularly disliked. Suggestions for improvement, change in format, or emphasis, etc. would be appreciated. Did you make such a comment?

    (a) yes
    (f) no (i.e. leave blank)

A.2. List of Courses and Corresponding Questionnaires

List of Courses and Questionnaire Type.

ype	Classification	Physics Course Numbers
1.	Lecture: (General or culture oriented)	101, 111, 112, 114, 400, 401
2.	Lecture: (Service oriented)	117, 121, 121H, 122, 122H, 161, 161H, 221, 222, 262, 262H 263, 263H, 420
3.	Lecture: (Physics major and General Physics Science major)	181, 182, 271, 283, 284, 404, 405, 406, 410, 411, 412, 413, 414, 421, 422, 423, 431, 441, 443, 451, 461, 463, 465, 471, 483, 601, 602, 604, 606, 622, 623, and all higher courses
4.	Recitation: T/A	117, 121, 121H, 122, 122H, 161, 161H, 262, 262H, 263, 263H
5.	Laboratory section of general course T/A	117, 121, 121H, 122, 122H, 161, 161H, 262, 262H, 263, 263H,
6.	"Unstructured" Laboratory Course	429, 621
7.	Laboratory Course:	285, 286, 365, 485,

APPENDIX A.3 - MINOR SUGGESTIONS FOR IMPROVEMENTS TO THE FALL 1971 QUESTIONNAIRES

[A reference 2.27 refers to question 27 on questionnaire 2]

A3.1 "Editorial" Suggestions

Move bottom instruction on each questionnaire (unnumbered) to top of front page, print it in capitals, and surround it by a border. Revise the wording?

Q 1.61, also 2.61, 3.56, 5.16, 6.44, 7.41:
In the "preamble" for each question, add "(FOR SUMMER SESSION, FIRST DIVIDE YOUR ANSWER BY TWO, then decide on the "appropriate" interval.)"

Q 2.20, also 3.20:
Change response f to read "there was no homework, or I prefer not to answer." (PRINT BOTH)

Q 2.53:
Change reference to question 52

Q 2.55:
Change reference to question 54

Q 3.53, also 4.36, 5.13:
Word as Q 1.58

Q 4.12:
Add a response "(e)the teacher did not adequately discuss these"

Questionnaire 5:
Change title to "Laboratory section of general courses - T/A"

Questionnaire 6:
Change title to "Unstructured Self-contained Laboratory course"

Questionnaire 7:
Change title to "Structured Self-contained Laboratory course"

Q 7.1:
Put a "star" before this question (It does apply to T/A's also.)

Questionnaire 6 heading, also Questionnaire 7:
Delete "All questions refer to the laboratory"

Q 6.4, also 7.4:
Change "thorough" to "excellent"

Q 6.43 and 6.44:
Interchange these questions, and correct the cross reference. THIS IS WRONG NOW.

Q 7.18:
add "(f) no answer"

Q 7.37:
add "(f) no answer (i.e. leave blank)"

Q 7.40 and 7.41:
Interchange these questions, and correct the cross reference. THIS IS WRONG NOW.

Q 7.44:
Change (f) to "(f) I prefer not to answer (i.e. leave blank)"

A3.2 Further Suggestions for More Questions

On questionnaire 5, add a question after question 11, similarly worded to Q4.16.

On questionnaires 1, 2, and 3 ask about whether the pace of the course was even or uneven, too fast due to efforts to cover the syllabus, etc? Speed at end of course?

On questionnaires 1, 2, and 3 ask about the speed with which graded homework and exams were returned -- this does reflect upon the instructor?

Consider whether questions 4 and 8 should be unscrambled. Alternatively, repeat them later on in unscrambled order as a test of "consistency?"

Repeat another question somewhere to test for "consistency?"

A3.3 An "Administrative" Suggestion

It has sometimes occurred that the "wrong" questionnaire was issued, or some other mixup occurred. Unfortunately students and instructors do not understand the interpretation of the code numbers, nor their importance. But PATS relies very heavily on the code number, followed by corrective detective work (of section 3.7, p. 3.12). To make sure one is dealing with the correct questionnaire, we offer two easy suggestions:

i) Have a (two part) question which asks:

1. If the number of this questionnaire in the range of 1-5, indicate its number here: a) 1, b) 2, c) 3, d) 4, e) 5.
2. If the number of this questionnaire is in the range 6-10, indicate its number here: a) 6, b) 7, c) 8, d) 9, e) 10.

ii) Alternatively, but less satisfactorily, make sure that each questionnaire has a different number of questions. Then scanning of original answer sheets provides easy clues on questionnaire number (scanning DATAREAD printout does not give this information, but see Appendix J.1.2, p. J1.1)

APPENDIX A4 -- QUESTIONNAIRE TYPES

Questionnaire 1 - "General" Courses (Lecturer) - Typically large enrolment freshmen or sophomore courses meeting the General Education Requirement. (65 questions)

Questionnaire 2 - "Service" courses (Lecturer) - typically large enrolment freshmen or sophomore courses forming a specific requirement for some other Department's major. (65 questions)

Questionnaire 3 - "Physics" Courses (Lecturer) - all lecture courses for physics or astronomy majors, undergraduate or graduate (60 questions)

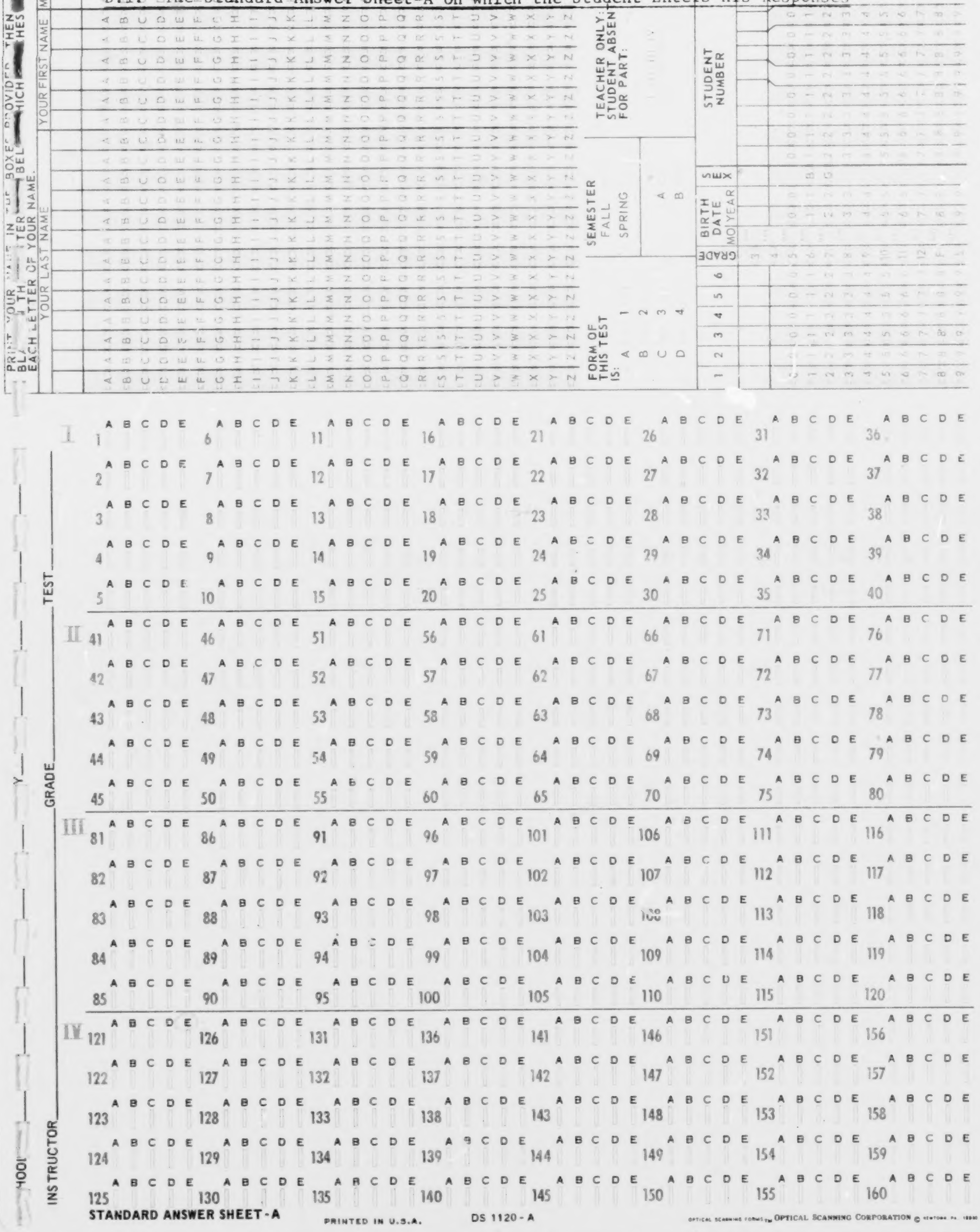
Questionnaire 4 - Recitations - to evaluate the recitation section (usually taught by a T/A) associated with "general" or "service" courses (42 questions)

Questionnaire 5 - Structured Laboratory Sections - to evaluate the lab section (usually taught by a T/A)associated with "general" or "service" courses (20 questions)

Questionnaire 6 - "unstructured" lab - to evaluate either the professor or the T/A in a separate lab course for advanced students taught in a deliberately non-cook-book, non-structured, non-guided manner (proto-real-world-research) (52 questions)

Questionnaire 7 - Laboratory Courses - to evaluate either the professor or the T/A in a separate lower level laboratory course. (45 questions)

B.1. The Standard Answer Sheet-A on Which the Student Enters his Responses



PRINT YOUR NAME IN THE BOXES PROVIDED THEN [redacted] BLACKEN THE LETTER BELOW WHICH [redacted] EACH LETTER OF YOUR NAME.

YOUR LAST NAME | YOUR FIRST NAME | MI

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

FORM OF THIS TEST IS: A 1 B 2 C 3 D 4

SEMESTER FALL A SPRING B

TEACHER ONLY: STUDENT ABSENT FOR PART: 1 2 3 4 5 6

STUDENT NUMBER 0 1 2 3 4 5 6 7 8 9

SEX B G

BIRTH DATE MO YEAR

GRADE 3 4 5 6 7 8 9 10 11 12 F

SCHOOL

INSTRUCTOR

GRADE

Y

TEST

I	1 A B C D E	6 A B C D E	11 A B C D E	16 A B C D E	21 A B C D E	26 A B C D E	31 A B C D E	36 A B C D E
	2 A B C D E	7 A B C D E	12 A B C D E	17 A B C D E	22 A B C D E	27 A B C D E	32 A B C D E	37 A B C D E
	3 A B C D E	8 A B C D E	13 A B C D E	18 A B C D E	23 A B C D E	28 A B C D E	33 A B C D E	38 A B C D E
	4 A B C D E	9 A B C D E	14 A B C D E	19 A B C D E	24 A B C D E	29 A B C D E	34 A B C D E	39 A B C D E
	5 A B C D E	10 A B C D E	15 A B C D E	20 A B C D E	25 A B C D E	30 A B C D E	35 A B C D E	40 A B C D E
II	41 A B C D E	46 A B C D E	51 A B C D E	56 A B C D E	61 A B C D E	66 A B C D E	71 A B C D E	76 A B C D E
	42 A B C D E	47 A B C D E	52 A B C D E	57 A B C D E	62 A B C D E	67 A B C D E	72 A B C D E	77 A B C D E
	43 A B C D E	48 A B C D E	53 A B C D E	58 A B C D E	63 A B C D E	68 A B C D E	73 A B C D E	78 A B C D E
	44 A B C D E	49 A B C D E	54 A B C D E	59 A B C D E	64 A B C D E	69 A B C D E	74 A B C D E	79 A B C D E
	45 A B C D E	50 A B C D E	55 A B C D E	60 A B C D E	65 A B C D E	70 A B C D E	75 A B C D E	80 A B C D E
III	81 A B C D E	86 A B C D E	91 A B C D E	96 A B C D E	101 A B C D E	106 A B C D E	111 A B C D E	116 A B C D E
	82 A B C D E	87 A B C D E	92 A B C D E	97 A B C D E	102 A B C D E	107 A B C D E	112 A B C D E	117 A B C D E
	83 A B C D E	88 A B C D E	93 A B C D E	98 A B C D E	103 A B C D E	108 A B C D E	113 A B C D E	118 A B C D E
	84 A B C D E	89 A B C D E	94 A B C D E	99 A B C D E	104 A B C D E	109 A B C D E	114 A B C D E	119 A B C D E
	85 A B C D E	90 A B C D E	95 A B C D E	100 A B C D E	105 A B C D E	110 A B C D E	115 A B C D E	120 A B C D E
IV	121 A B C D E	126 A B C D E	131 A B C D E	136 A B C D E	141 A B C D E	146 A B C D E	151 A B C D E	156 A B C D E
	122 A B C D E	127 A B C D E	132 A B C D E	137 A B C D E	142 A B C D E	147 A B C D E	152 A B C D E	157 A B C D E
	123 A B C D E	128 A B C D E	133 A B C D E	138 A B C D E	143 A B C D E	148 A B C D E	153 A B C D E	158 A B C D E
	124 A B C D E	129 A B C D E	134 A B C D E	139 A B C D E	144 A B C D E	149 A B C D E	154 A B C D E	159 A B C D E
	125 A B C D E	130 A B C D E	135 A B C D E	140 A B C D E	145 A B C D E	150 A B C D E	155 A B C D E	160 A B C D E

STANDARD ANSWER SHEET-A PRINTED IN U.S.A. DS 1120-A

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B.2. Instructions Issued to the Instructor with Packet of Materials

Provisional 1972

Concerning the Teaching Assessment Questionnaires
Guide for Instructors, (Including TA's)

1. Introduction, General Policy

This envelope contains the Physics Department teaching assessment questionnaire for this semester, as well as answer sheets and pencils.

Please recall that the use of such questionnaires is mandatory, as part of Departmental policy under the supervision of the Department's Teaching Excellence Committee. If for any reason you do not wish to issue such questionnaires, please consult with the chairman of that committee.

Please issue this questionnaire during scheduled class time, at the beginning of a class. (Experience suggests that with planning the whole operation need take no more than 15-20 minutes.) Choose the actual class period with care, to obtain good and fair participation, and if possible, during the week of ______________________________.

2. Immediate Instructions

Please check immediately that you have received the correct forms and check the information on the outside of the envelope. If any error is found, please inform Dr. Griggs immediately, and return the envelope to him. Do not issue forms.

Please note specifically the following points:

a) There are 7 different formats of questionnaire, to cover the three different teaching situations (lecture/lab/recitation) and according to whether professor or TA is being assessed. Make sure you have the right ones.

b) Check course number, section number, name of instructor or TA.

c) If two professors or two TA's are involved in the same section, the forms are not applicable. Please check with Dr. Griggs for the procedure to follow.

d) Please check the 9 digit code number. The first 3 digits should be the course number, the 5,6,&7th digits should be the section number, and the 8th digit should be the questionnaire number.

Please note that there have been various revisions to the procedure and to the questionnaire.

3. Instructions When Actually Issuing Questionnaires

1. Copy onto the chalk board the entire legend on the brown envelope, except the encircled numbers. This is a reminder to the students to mark their score sheets appropriately.
2. Please do not try to get returns from absent students. Those loose sheets do not get coded properly, so usually cannot be run through the machine and used.
3. Please ask a student to collect the forms, to put them in the original containers, and to return them to Dr. Griggs' office, Z-115; for Astronomy, Mrs. Mizrahi. (This avoids any suspicion that the instructor reads the answer sheets before they are processed and before grades are issued.)
4. Please collect the pencils so that they can be re-used. We also need the questionnaires so that the results can be accompanied by copies of the questions. These can be returned either by you, separately, or with the answer sheets.
5. Enter on the packet envelope your best estimate of the number of students actually participating in the course[*] at this time (i.e. number of officially enrolled students minus number of unofficial "dropped out" students - F[*])

---

[*] to be distinguished from those present on the day the questionnaire is issued.

TEACHING ASSESSMENT QUESTIONNAIRES
(Guide for Instructors, including TA's)

Revised July 1971

I. WARNING: Do not give out two different questionnaires to each student at one time. Chaos will ensue! If you use two different questionnaires on the same occasion (avoid this if possible) make sure one set is completely in and the code number changed on the blackboard before you issue the second set.

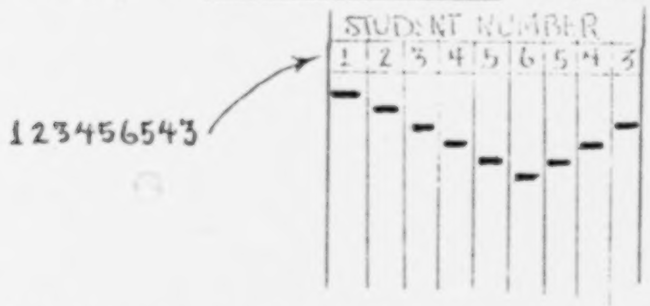
II. Classroom Procedure for Instructor

a) Announce that the questionnaire is to be distributed, ask that students who wish to abstain first record their abstention on the form. (They may then leave.)
b) Ask that no one write anything until instructions have been read out. Distribute pencils, questionnaires, answer sheets, and comment sheets.
c) Prepare on the blackboard a listing of: Course Number, Section Number, name of person being evaluated, whether lecture, lab or recitation is being evaluated, and whether the instructor or the teaching assistant is being evaluated: e.g.:

Phys 100, Section 201, John Doe, Lab, T/A

I

d) Put the code number and "sketch" of blacked in boxes on the board, as shown in the sample. USE THE CORRECT CODE, as provided on the outside of the envelope.



II

e) Ask the students to copy the information in block I onto the top of the STANDARD ANSWER SHEET, and to enter the code number as shown in II in the space marked "Student Number" on the Standard Answer Sheet.

Ask students to read the Revised instructions, and to fill out the standard answer sheets. Tell them that if they wish to amplify their responses, or to comment upon other items, such comments should be made on the separate "comment sheet." In that case, they should fill in the identifying information on the comment sheet.

III. At End

Collect all answer sheets, whether blank or otherwise, also all comment sheets, also pencils. Do not collect questionnaires.

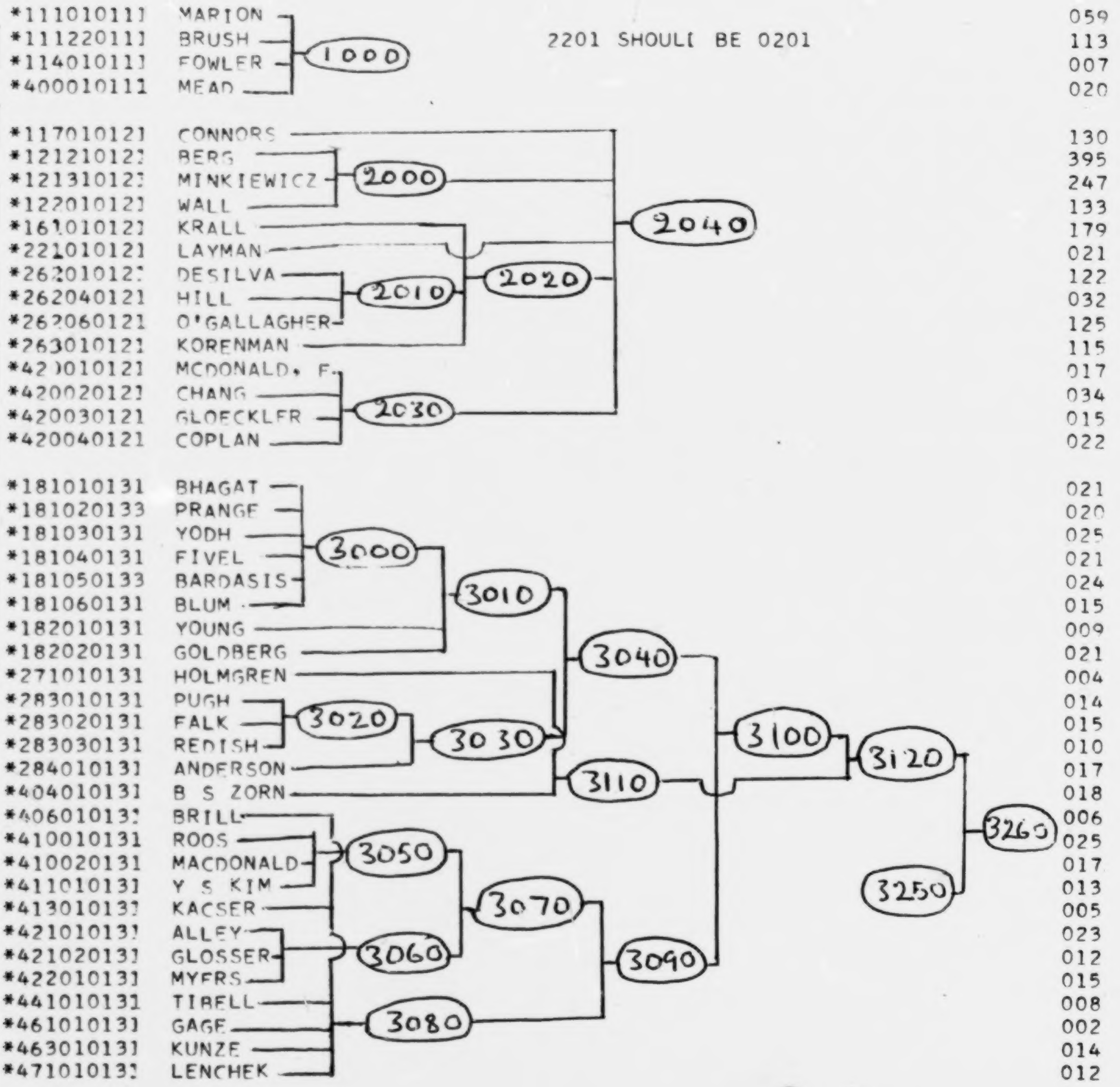
Put all these materials in the original envelope, seal it, and have a student take this envelope to Dr. Griggs -- Room Z-115. The use of a student is important.

APPENDIX C. MATERIALS NEEDED FOR PREPARATION OF AGGREGATES USING AGGFORM

C.1. Heirarchical Aggregate Tree, also the Header Card Deck

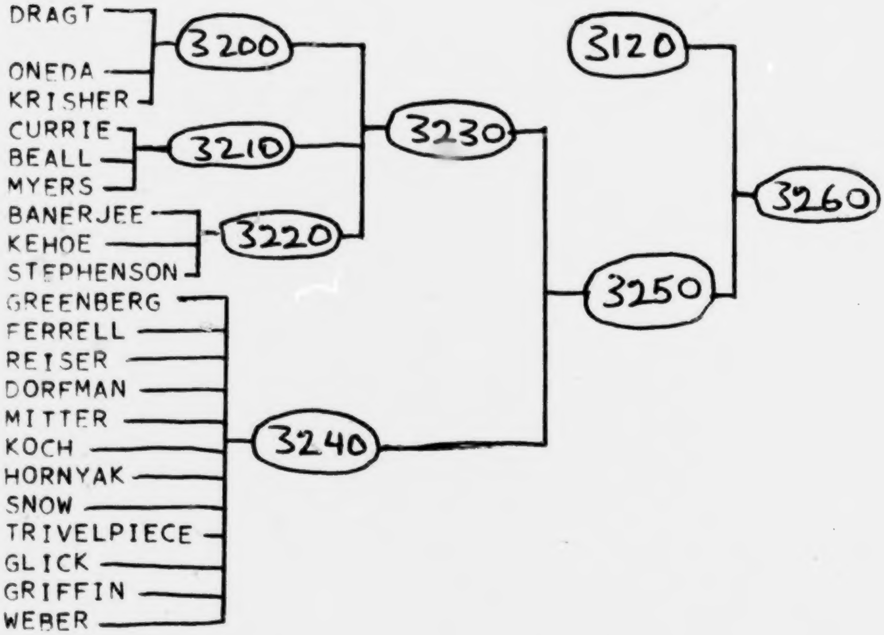
(The "code" is explained at the bottom of p. C1.3.)

This tree is drawn directly upon the header card deck, and shows some comments, as well as the enrolment in the rightmost columns.

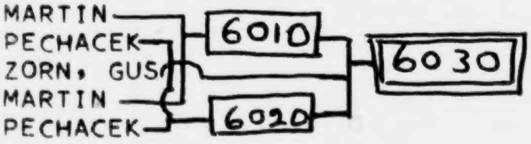


```
*111010111   MARION                                          059
*111220111   BRUSH                                           113
*114010111   FOWLER          2201 SHOULI BE 0201             007
*400010111   MEAD                                            020

*117010121   CONNORS                                         130
*121210121   BERG                                            395
*121310121   MINKIEWICZ                                      247
*122010121   WALL                                            133
*161010121   KRALL                                           179
*221010121   LAYMAN                                          021
*262010121   DESILVA                                         122
*262040121   HILL                                            032
*262060121   O'GALLAGHER                                     125
*263010121   KORENMAN                                        115
*420010121   MCDONALD, F.                                    017
*420020121   CHANG                                           034
*420030121   GLOECKLER                                       015
*420040121   COPLAN                                          022

*181010131   BHAGAT                                          021
*181020133   PRANGE                                          020
*181030131   YODH                                            025
*181040131   FIVEL                                           021
*181050133   BARDASIS                                        024
*181060131   BLUM                                            015
*182010131   YOUNG                                           009
*182020131   GOLDBERG                                        021
*271010131   HOLMGREN                                        004
*283010131   PUGH                                            014
*283020131   FALK                                            015
*283030131   REDISH                                          010
*284010131   ANDERSON                                        017
*404010131   B S ZORN                                        018
*406010131   BRILL                                           006
*410010131   ROOS                                            025
*410020131   MACDONALD                                       017
*411010131   Y S KIM                                         013
*413010131   KACSER                                          005
*421010131   ALLEY                                           023
*421020131   GLOSSER                                         012
*422010131   MYERS                                           015
*441010131   TIBELL                                          008
*461010131   GAGE                                            002
*463010131   KUNZE                                           014
*471010131   LENCHEK                                         012
```

Continues



*601010131	DRAGT		031
*601020131	ONEDA		014
*602010131	KRISHER		019
*604010131	CURRIE		010
*604020131	BEALL		035
*606010131	MYERS		014
*622010131	BANERJEE		018
*622020131	KEHOE		028
*623010131	STEPHENSON		018
*624010131	GREENBERG		012
*624020131	FERRELL		011
*636010131	REISER		001
*704010131	DORFMAN		016
*711010131	MITTER		014
*731010131	KOCH		014
*741010131	HORNYAK		008
*751010131	SNOW		011
*761010131	TRIVELPIECE		027
*832010131	GLICK		014
*844010131	GRIFFIN		010
*851010131	WEBER		007
*122010642	WALL	FACULTY RECITATION SEC- NOT SEC 105	016
*121021651	BERG	FACULTY LAB SECTION - NOT SEC 215	022



*429010162	MARTIN	001
*429010163	PECHACEK	003
*621010161	ZORN, GUS	006
*621010162	MARTIN	005
*621010163	PECHACEK	003

Tree continues on next page

"Code": (cf. § 5.2, p5.1 for explanation of terms)

⬭ ≡ "regular" aggregate, only P and Q weightings

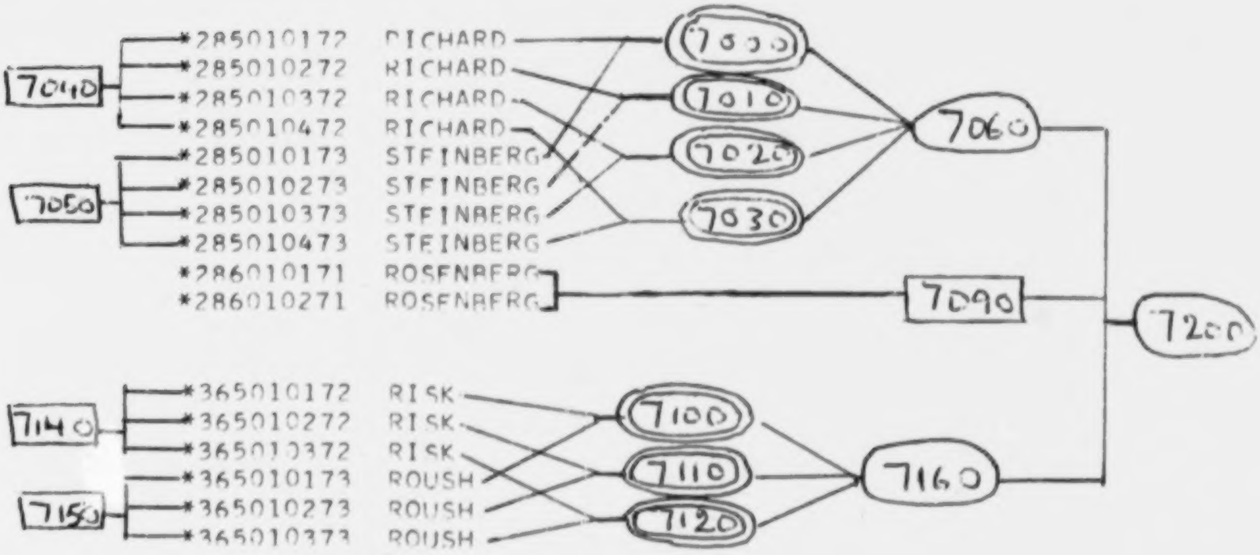
▭ ≡ complete description aggregate

▣ ≡ aggregate with P, Q and R weighting

◎ ≡ a combination aggregate

```
*285010172  RICHARD                 TEAM TAUGHT                                  012
*285010272  RICHARD                 TEAM TAUGHT                                  008
*285010372  RICHARD                 TEAM TAUGHT                                  008
*285010472  RICHARD                 TEAM TAUGHT                                  010
*285010173  STEINBERG               SCRAMBLED-NOT SEC 101 /TEAM TAUGHT           012
*285010273  STEINBERG               SCRAMBLED-NOT SEC 102 /TEAM TAUGHT           008
*285010373  STEINBERG               SCRAMBLED-NOT SEC 103 /TEAM TAUGHT           008
*285010473  STEINBERG               SCRAMBLED-NOT SEC 104 /TEAM TAUGHT           010
*286010171  ROSENBERG                                                            013
*286010271  ROSENBERG                                                            004
*365010172  RISK                    TEAM TAUGHT                                  011
*365010272  RISK                    TEAM TAUGHT                                  004
*365010372  RISK                    TEAM TAUGHT                                  005
*365010173  ROUSH                   TEAM TAUGHT                                  011
*365010273  ROUSH                   TEAM TAUGHT                                  004
*365010373  ROUSH                   TEAM TAUGHT                                  005
```

(See below for heirarchy) ↓


7040
*285010172 RICHARD
*285010272 RICHARD
*285010372 RICHARD
*285010472 RICHARD
7050
*285010173 STEINBERG
*285010273 STEINBERG
*285010373 STEINBERG
*285010473 STEINBERG
*286010171 ROSENBERG
*286010271 ROSENBERG
7000
7010
7020
7030
7060
7090
7200
7140
*365010172 RISK
*365010272 RISK
*365010372 RISK
7150
*365010173 ROUSH
*365010273 ROUSH
*365010373 ROUSH
7100
7110
7120
7160

<u>"Code"</u>, (cf. § 5.2, p 5.1, for explanation of terms)

⬭ = "regular" aggregate, only P and Q weightings

☐ = complete description aggregate

▣ = aggregate with P, Q and R weightings

◎ = a <u>combination</u> aggregate

C.2. Specification of Aggregate Titles; also showing "comments" where appropriate

Each aggregate number is shown underlined, followed on the next line by its title, which is then followed on subsequent lines by comments when appropriate (again underlined). The number on the extreme right on the aggregate number line is the number of copies needed in multiplemania, cf. section 5.6.2, p. 5.8.

(This is only a partial listing, but is part of our standard example, cf. p. C1.1)

```
AGGREGATE 2000.                                                            3.
PHYSICS 121/2
AGGREGATE 2010.                                                            3.
PHYSICS 252
AGGREGATE 2020.                                                            5.
PHYSICS 161//262/3
AGGREGATE 2030.                                                            4.
PHYSICS 429
AGGREGATE 2040.                                                           14.
ALL PHYSICS SERVICE COURSES
AGGREGATE 1000.                                                            4.
ALL GENERAL PHYSICS COURSES
AGGREGATE 7040.                                                            1.
PHYSICS 285 --  RICHARD
SINCE THESE COURSES WERE TEAM TAUGHT, THIS DESCRIPTION IS BASED ON A HALF-VIEW
AGGREGATE 7050.                                                            1.
PHYSICS 235 --- STEINBERG
SINCE THESE COURSES WERE TEAM TAUGHT, THIS DESCRIPTION IS BASED ON A HALF-VIEW
THIS AGGREGATE IS COMPUTED AND IF NECESSARY FORCED IN ORDER TO FORM LATER ONES
AGGREGATE 7060.                                                            2.
PHYSICS 285
AGGREGATE 3200.                                                            3.
PHYSICS 601/2
AGGREGATE 3210.                                                            3.
PHYSICS 604/606
AGGREGATE 3220.                                                            3.
PHYSICS 622/3
AGGREGATE 3230.                                                            9.
PHYSICS 601/2//604//606//622/3 FIRST YEAR GRADUATE COURSES
AGGREGATE 3240.                                                           12.
ALL UPPER LEVEL PHYSICS GRADUATE COURSES
AGGREGATE 3110.                                                            2.
(GENERAL) PHYSICAL SCIENCES COURSES
AGGREGATE 3120.                                                           26.
ALL UNDERGRADUATE PHYSICS MAJOR AND PHSYICAL SCIENCES MAJOR COURSES
AGGREGATE 3250.                                                           21.
ALL PHYSICS GRADUATE COURSES
AGGREGATE 3260.                                                           47.
ALL PHYSICS MAINSTREAM UNDERGRAD (INCL. G.P.S.) AND GRADUATE COURSES
AGGREGATE 6030.                                                            3.
PHYSICS 429//621 'GRADUATE' PHYSICS LAB
***IGNORE THE MIDDLE SET OF DISTRIBUTIONS - WEIGHTED BY SECTIONS ***
   SINCE MARTIN AND PECHACEK ARE EACH IMPROPERLY COUNTED AS 2 SECTS.
AGGREGATE 7160.                                                            2.
PHYSICS 365
```

APPENDIX D. DATAREAD and INITPRT MATERIALS

D.1. DATAREAD Materials needed for Program Execution

D.1.a) DATAREAD Command and Descriptor Cards as Inputted - A Complete Run Deck

```
  Either
@RUN PTA,205271KACSER,KACSER,2,1000
  or, if and only if one wants punched card output-file
@RUN PTA,205271KACSER,KACSER,2,1000/10000 ←Punched card estimate!
@MSG  *********PLEASE SAVE PUNCHED OUTPUT **********************
@MSG    ***********  THANK YØU  - C KACSER - 205271KACSER

@PASSWD ABCDEF   - ABCDEF represents your password.
@ASG,T PRØGRAMTAPE,8C9,P1361N -assigns the tape (#P1361)on which the program is
@FIND,A PRØGRAMTAPE.DATAREAD}                                           stored.
@CØPIN,A PRØGRAM.DATAREAD   }-locates DATAREAD and copies it temporarily
@FREE PRØGRAMTAPE           }     into 1108
  Either ("preferred" option)
@ASG,T PUNCHTAPE,8C9,SAVER} -if output file is to be put on a "SAVER" tape
@USE 1,PUNCHTAPE          }       in 8C9 format (or give actual tape no.).
  or
@DELETE,C PTDATA          }-if output file is to be put on a FASTRAND file called
@ASG,CPX PTDATA,F/1//250  }  PTDATA; notice we first delete in case it already
@USE 1,PTDATA             }  existed with contents from a previous execution.

  or
 No cards  - if output is to be punched
@XQT DATAREAD

$UNIT  01      PUNCH - unit command card for output file

$HEADER  ⑩                       - header command card
*         0210 ID                 - header ID descriptor
          0103 COURSE           }
          0507 SECTION          } -header ID subfield descriptors
          0404 PHYS-ASTRO-MISC  }
          0909 PROF-TA          }

*         1336 INSTRUCTOR       } - general header field descriptors
*         3973 COMMENT          }
*         7678 SIZE               - header size descriptor
*         8080 PHYSICS RESULTS  } - general header field descriptors used to input
*         8080 SPRING 72        }   special information (col. 80 is empty on the
$DATA                                                                    header!)
                                 - Data command card
       ⑩ 0109 ID                 - data ID descriptor
J       121352 SEQUENCE   }- data sequence descriptors
K       121337 SEQUENCE   }
$FORM           2                - form command card
*         0909 2
          0808 2                 - form header descriptor
                                 -form data descriptor
```

PROGRAM CONTINUES ON NEXT PAGE

```
$START                  - START command - followed by DIGITEK subdeck, cf sect 3.6C/ p 3.11
*122150125  CRAIG                                        - first header card       015
020 12515 0J       00001120 1211 0121 2111 1121          - first digitek card
020 12515 0K000000000000000200 1120111                    - second digetek card
110 12515 1J           1120 2211 1111 2221 2021          - etc.
110 12515 1K0 00      00 112110 1110011
        DIGITEK SUBDECK CONTINUES, with both digetek cards and headers, till
        appropriate questionnaire results exhausted - cf section 3.6C, p 3.11.
          .
          .
          .
          .
          .
$END      - End command card - comes at end of a single questionnaire subdeck.

       ① ⑨
$DATA
          0109 ID
J       121352 SEQUENCE
K       121314 SEQUENCE
$FORM            4
*         0909 4
          0808 4
$START           - START command
    DIGITEK SUBDECK GOES HERE -
      header
      digitek cards
      header
      digitek cards
       .
$END

NEXT QUESTIONNAIRE CONTROL AND DIGITEK SUBDECK - precisely as above, with $END.
NEXT    "      "      "      "      "      "      "      "      "   with $END.
   .
$STOP            - STOP command  - This terminates the complete DATAREAD Deck.

'FIN             - 1108 termination
'MSG  ******** PLEASE SAVE PUNCHED OUTPUT *********************
'MSG MANY THANKS
'FIN
```

STARTING A NEW QUESTIONNAIRE SUBDECK -
since the header format remains unchanged, there is no need to repeat the header and ID command and descriptor cards.
Since only the data format has changed, as well as the questionnaire number (form), only the data and form cards appear here.

IMPORTANT NOTES

1. *Throughout the above, italic letters indicate interpretative comments, etc. and do not form part of the DATAREAD deck. Sometimes however they do indicate the presence of IBM cards.*
2. *The ' at the beginning of some lines indicates a 7/8 punch (i.e. an @)*
3. *Vertical rulings and small circled numbers indicate columns on the IBM cards.*

D.1.b) DATAREAD Command and Descriptor Cards as "Directly" Printed Out, with only minor format changes

```
@XQT QUESTION
 /$/UNIT  / 1/ 0/ 0/PUNCH
 /$/HEADER/ 0/ 0/ 0/
 /*/      / 0/ 2/10/ID
 / /      / 0/ 1/ 3/COURSE
 / /      / 0/ 5/ 7/SECTION
 / /      / 0/ 4/ 4/PHYS-ASTRO-MISC
 / /      / 0/ 9/ 9/PROF-TA
 /*/      / 0/13/36/INSTRUCTOR
 /*/      / 0/39/73/COMMENT
 /*/      / 0/76/78/SIZE
 /*/      / 0/80/80/PHYSICS RESULTS
 /*/      / 0/80/80/SPRING 72
 /$/DATA  / 0/ 0/ 0/
 / /      / 0/ 1/ 9/ID
 /J/      /12/13/52/SEQUENCE
 /K/      /12/13/37/SEQUENCE
 /$/FORM  / 0/ 0/ 0/2
 /*/      / 0/ 9/ 9/2
 / /      / 0/ 8/ 8/2
 /$/START / 0/ 0/ 0/
```

D.1.c) DATAREAD Command and Descriptor Cards as Interpreted by the Program

```
QUESTIONNAIRE 2
HEADER  COL. TO COL.
======================================:
            2      10  ID
           76      78  SIZE
            9       9  2
           13      36  INSTRUCTOR
           39      73  COMMENT
           80      80  PHYSICS RESULTS
           80      80  SPRING 72
```

Header card format, cf p. 3.9.

questionnaire 2, located within ID

A "trick" used to input these into each section (col. 80 is blank!)

```
 DATA   COL. TO COL.
======================================:
            1       9  ID
            8       8  2
======================================:
 CARD   COL. TO COL.        COL. SEQUENCE
======================================:
   1    13      52  DATA    12   J
   2    13      37  DATA    12   K
```

DIGITEK card format, cf sect 3.5, p3.7

questionnaire 2, located within ID

first data card has J in col 12, and data in cols 13-52, second has K in col 12, and data in cols 13-37.

```
  ID    COL. TO COL.
======================================:
            1       3  COURSE
            5       7  SECTION
            4       4  PHYS-ASTRO-MISC
            9       9  PROF-TA
```

ID format, cf Table 3.2, p 3.4.

D.2. Sample DATAREAD Printout for One Section

D.2.a) Part of the Beginning of a Section Printout

CRAIG
WRONG
DATA INPUT (CARDS)

```
=============================================================
HEADER
=============================================================
QUESTIONNAIRE 2
ID 122150125
ENROLLMENT  15
INSTRUCTOR                 /CRAIG                    /
COMMENT                    /                                /
PHYSICS RESULTS            / /
SPRING 72                  / /
=============================================================
DATA SET    1
ID 020 12515
CARD 1    SEQUENCE J    DATA/       00001120 1211 0121 2111 1121          /
CARD 2    SEQUENCE K    DATA/00000000000000200 1120111/
                                                                                  *** ID CHECK ***

DATA SET    2
ID 110 12515
CARD 1    SEQUENCE J    DATA/            1120 2211 1111 2221 2021          /
CARD 2    SEQUENCE K    DATA/0 00     00 112110 1110011/
                                                                                  *** ID CHECK ***

DATA SET    3
ID 020 12515
CARD 1    SEQUENCE J    DATA/       000 0040 2200 0010 2120 1021          /
CARD 2    SEQUENCE K    DATA/0000000000 11120001420111/
                                                                                  *** ID CHECK ***

DATA SET    4
ID 010 12515
CARD 1    SEQUENCE J    DATA/       000 0140 3310 0010 1111 0022          /
CARD 2    SEQUENCE K    DATA/000 000000011110  4120111/
                                                                                  *** ID CHECK ***

DATA SET    5
ID 000 12515
CARD 1    SEQUENCE J    DATA/         0  0920 2310 0000 1111 0021          /
CARD 2    SEQUENCE K    DATA/0000000  0 12221  2101111/
                                                                                  *** ID CHECK ***

DATA SET    6
ID 010
CARD 1    SEQUENCE J    DATA/       00000040 2310 0010 2111 1021          /
CARD 2    SEQUENCE K    DATA/0000000000 120210 2121111/
                                                                                  *** ID CHECK ***
```

Continues

D.2.b) The "Summed" Data Output File Printout for DATAREAD, for the Section shown in Appendix D.2.a. The actual output file content is also shown.

```
=================================================================
QUESTIONNAIRE 2
ID 122150125
ENROLLMENT  15
INSTRUCTOR              /CRAIG                /
COMMENT                 /                               /
PHYSICS RESULTS         / /
SPRING 72               / /
=================================================================
COURSE                  /122/
SECTION                 /501/
PHYS-ASTRO-MISC         /1/
PROF-TA                 /5/
=================================================================

SECTION  1     15 DATA SETS PROCESSED AS VALID
DATA SETS   1 -  15
------------------------------------------------------------------------------
OUTPUT FILE
------------------------------------------------------------------------------
 15 15652013 6 2 9 6 3 7 315 1 7 11024 73515 1 9 1 0 0 0 0 0
QUESTIONNAIRE2      ID122150125COURSE122SECTION501PHYS-ASTRO-MISC1PROF-TA5
INSTRUCTORCRAIG                   COMMENT
PHYSICS RESULTS SPRING 72         COMMENT
 0 0 0 0 015 0 0 0 0 015 0 0 0 0 114 0 0 1 0 014 0 0 0 0 015 0 0 0 0 015
10 0 0 1 0 4 9 0 1 0 0 510 0 0 1 0 4 4 0 0 0 01111 4 0 0 0 0 6 9 0 0 0 0
 1 0 8 0 6 015 0 0 0 0 0 0 0 0 015 0 7 7 1 0 0 0 010 5 0 0 410 1 0 0 0
10 5 0 0 0 0 0 0 0 0 01511 4 0 0 0 011 4 0 0 0 0 212 1 0 0 012 3 0 0 0 0
 0 0 0 0 015 0 411 0 0 0 3 8 4 0 0 0 111 3 0 0 0 411 0 0 0 0 0 0 0 0 015
 7 7 1 0 0 012 1 0 0 1 1 1 113 0 0 0 2 9 4 0 0 0 0 0 0 0 015 0 0 0 0 015
 1 0 0 0 014 0 0 0 0 015 0 0 0 0 015 0 0 0 0 01513 0 0 0 0 213 0 0 0 0 2
15 0 0 0 0 0 9 0 0 0 0 613 0 0 0 0 212 0 0 0 0 310 0 0 0 0 510 0 0 0 0 5
 9 0 0 0 0 611 0 0 0 0 4 5 0 2 0 0 8 510 0 0 0 0 2 6 7 0 0 0 3 5 7 0 0 0
 3 3 9 0 0 0 8 7 0 0 0 010 1 0 0 1 3 4 0 0 0 110 0 5 8 0 2 0 012 0 0 2 1
 4 2 8 0 0 110 5 0 0 0 0 113 0 0 0 1 112 1 0 1 0 411 0 0 0 0
=================================================================
```

Redundant printout

Shows which data sets have been summed

This is the actual output file; it is the input for INITPRT and for AGGFORM. Section records follow directly upon each other.

D.3. Sample Cover Note with Distribution of INITPRT

To All Physics Faculty and Teaching Assistants

From: C. Kacser

Date: July 19, 1971

Herewith the first output from the Spring 1971 teaching questionnaire. It should be self explanatory, if read with a copy of the appropriate questionnaire, attached herewith.

In a week's time all such outputs will be put in the Toll Lounge. If there is any reason to doubt the present output, please see me immediately. We assumed that the answer sheets in an envelope referred to the course, section, prof or T/A named on that envelope. We did not sort by the code number, since it became clear that the code number, as entered, was not a reliable indicator. However we do have the code numbers, and it is possible to do detective work in cases where it seems indicated. For this reason, we are holding back the original answer sheets for one week. In a week's time these sheets, having written comments on them, will be available in Dr. Griggs' office for inspection there.

The number of abstentions was determined from the minimum number of blank (f) responses, not from question 1, which was apparently answered by students as a question about their desires, not their acts. The individual counts of f were adjusted, so that the display presents f - minimum f. Clearly this is not quite correct.

We plan to accumulate the data in reasonable ways to provide the departmental average distributions. E.g. sum over all sections of a course, sum over all courses of one type: Phys. 15, 16, 17, 18, etc. But this will take time. Please be patient.

Alter:

TO: Faculty and Teaching Assistants for Spring 1972

FROM: Dr. Bruce A. Barnett B.A.B.

DATE: July 20, 1972

I have reached that point in the analysis of teaching questionnaires for Spring 1972 where the instructors are asked to point out any obvious errors. You should receive a computer summary for each of the classes which you taught last spring. Please confirm that the data is correct, i.e. course number, section number, enrollment, responses, etc., and if an error is suspected contact me before August 1.

APPENDIX E. SAMPLE OUTPUTS SEEN BY INDIVIDUAL INSTRUCTORS

E.1. Sample PATS Output for an Individual Section

```
PHYSICS FACULTY, FALL 1971 - TEACHING SURVEY RESULTS                                  PAGE 141
                      INDIVIDUAL SECTIONS                                              01/25/72


QUESTIONNAIRE NO. 3

          C O U R S E U*   * * S E C T I O N 0 1 0 1
          ----------------------------------------------

          I N S T R U C T O R :Z*



          (ESTIMATE)       5  STUDENTS WERE ENROLLED IN THIS SECTION

                           5  STUDENTS PARTICIPATING COMPLETED THE QUESTIONNAIRE

                           0  STUDENTS PARTICIPATING CHOSE TO ABSTAIN

                           0  STUDENTS WERE NOT ACCOUNTED FOR

          (ESTIMATE)     100  PER CENT (   5/   5) OF STUDENTS ENROLLED COMPLETED THE QUESTIONNAIRE
```

*(number and name have been "censored")

```
QUESTIONNAIRE RESULTS FOR COURSE U*  SECTION  101   INSTRUCTOR Z*
------------------------------------------------------------------------------------------

                                                                                          QUESTIONNAIRE NO.  3

QUEST  I               PERCENTAGE                     I            ACTUAL NUMBER                  I
NUMB   I              DISTRIBUTION                    I             OF STUDENTS                   I
       I     A      B      C      D      E      F     I     A      B      C      D      E      F  I
-------I----------------------------------------------I-------------------------------------------I
   1   I   40.0   60.0    .0     .0     .0     .0     I    2.0    3.0    .0     .0     .0     .0   I
   2   I  100.0    .0     .0     .0     .0     .0     I    5.0    .0     .0     .0     .0     .0   I
   3   I   20.0   80.0    .0     .0     .0     .0     I    1.0    4.0    .0     .0     .0     .0   I
   4   I    .0    20.0   40.0    .0    40.0    .0     I    .0     1.0    2.0    .0    2.0     .0   I
   5   I  100.0    .0     .0     .0     .0     .0     I    5.0    .0     .0     .0     .0     .0   I
   6   I    .0    60.0   40.0    .0     .0     .0     I    .0     3.0    2.0    .0     .0     .0   I
   7   I    .0    60.0    .0     .0     .0    40.0    I    .0     3.0    .0     .0     .0    2.0   I
   8   I    .0     .0    20.0   40.0    .0    40.0    I    .0     .0     1.0    2.0    .0    2.0   I
   9   I   40.0   60.0    .0     .0     .0     .0     I    2.0    3.0    .0     .0     .0     .0   I
  10   I   40.0   60.0    .0     .0     .0     .0     I    2.0    3.0    .0     .0     .0     .0   I
  11   I   60.0   20.0   20.0    .0     .0     .0     I    3.0    1.0    1.0    .0     .0     .0   I
  12   I   60.0   40.0    .0     .0     .0     .0     I    3.0    2.0    .0     .0     .0     .0   I
  13   I   60.0   20.0   20.0    .0     .0     .0     I    3.0    1.0    1.0    .0     .0     .0   I
  14   I   80.0   20.0    .0     .0     .0     .0     I    4.0    1.0    .0     .0     .0     .0   I
  15   I   60.0   40.0    .0     .0     .0     .0     I    3.0    2.0    .0     .0     .0     .0   I
  16   I    .0    20.0   60.0   20.0    .0     .0     I    .0     1.0    3.0    1.0    .0     .0   I
  17   I    .0    60.0   40.0    .0     .0     .0     I    .0     3.0    2.0    .0     .0     .0   I
  18   I   40.0   60.0    .0     .0     .0     .0     I    2.0    3.0    .0     .0     .0     .0   I
  19   I   60.0   40.0    .0     .0     .0     .0     I    3.0    2.0    .0     .0     .0     .0   I
  20   I   60.0   40.0    .0     .0     .0     .0     I    3.0    2.0    .0     .0     .0     .0   I
  21   I   40.0   40.0   20.0    .0     .0     .0     I    2.0    2.0    1.0    .0     .0     .0   I
  22   I   20.0   80.0    .0     .0     .0     .0     I    1.0    4.0    .0     .0     .0     .0   I
  23   I   40.0   60.0    .0     .0     .0     .0     I    2.0    3.0    .0     .0     .0     .0   I
  24   I    .0    80.0   20.0    .0     .0     .0     I    .0     4.0    1.0    .0     .0     .0   I
  25   I   20.0   40.0   40.0    .0     .0     .0     I    1.0    2.0    2.0    .0     .0     .0   I
  26   I    .0     .0     .0     .0     .0   100.0    I    .0     .0     .0     .0     .0    5.0   I
  27   I   20.0    .0     .0     .0     .0    80.0    I    1.0    .0     .0     .0     .0    4.0   I
  28   I    .0     .0     .0     .0     .0   100.0    I    .0     .0     .0     .0     .0    5.0   I
  29   I    .0     .0     .0     .0     .0   100.0    I    .0     .0     .0     .0     .0    5.0   I
  30   I   20.0    .0     .0     .0     .0    80.0    I    1.0    .0     .0     .0     .0    4.0   I
  31   I    .0     .0     .0     .0     .0   100.0    I    .0     .0     .0     .0     .0    5.0   I
  32   I    .0     .0     .0     .0     .0   100.0    I    .0     .0     .0     .0     .0    5.0   I
  33   I    .0     .0     .0     .0     .0   100.0    I    .0     .0     .0     .0     .0    5.0   I
  34   I    .0     .0     .0     .0     .0   100.0    I    .0     .0     .0     .0     .0    5.0   I
  35   I    .0     .0     .0     .0     .0   100.0    I    .0     .0     .0     .0     .0    5.0   I
```

(* course number and name have been "censored")

This actually continues

```
QUESTIONNAIRE NO.  3

          C O U R S E  2 8 4 * *  S E C T I O N  0 1 0 1
          ----------------------------------------------


          I N S T R U C T O R :   ANDERSON



          (ESTIMATE)     17  STUDFNTS WERE ENROLLED IN THIS SECTION

                          6  STUDENTS PARTICIPATING COMPLETED THE QUESTIONNAIRE

                          0  STUDFNTS PARTICIPATING CHOSE TO ABSTAIN

                         11  STUDENTS WERE NOT ACCOUNTED FOR

          (ESTIMATE)     35  PER CENT (   6/  17) OF STUDENTS ENROLLED COMPLETED THE QUESTIONNAIRE


        ******************************************************************************************
        ***** W A R N I N G : LESS THAN 70 PER CFNT OF ENROLLED STUDENTS COMPLETED THE QUESTIONNAIPE *****
        ******************************************************************************************

                          ******************************************************
                          ******     E X T R F M E   C A U T I O N,      ******
                          ******                                         ******
                          ****** THE RESULTS BFLOW SHOULD BE TAKEN WITH  ******
                          ****** A MASSIVE GRAIN OF SALT, AS LESS THAN   ******
                          ****** 50 PERCENT OF STUDENTS ENROLLED COMPLETED******
                          ****** THE QUESTIONNAIRE.                      ******
                          ******                                         ******
                          ******************************************************
```

THE DISTRIBUTIONS ARE THEN PRINTED

Continues

```
QUESTIONNAIRE NO. 2

        C O U R S E  1 6 1 * *  S E C T I O N  0 1 0 1
        ----------------------------------------------


        I N S T R U C T O R :   KRALL



        (ESTIMATE)     179  STUDENTS WERE ENROLLED IN THIS SECTION

                       122  STUDENTS PARTICIPATING COMPLETED THE QUESTIONNAIRE

                         1  STUDENTS PARTICIPATING CHOSE TO ABSTAIN

                        56  STUDENTS WERE NOT ACCOUNTED FOR

        (ESTIMATE)      68  PER CENT ( 122/ 179) OF STUDENTS ENROLLED COMPLETED THE QUESTIONNAIRE


      ***********************************************************************************************
      ***** W A R N I N G : LESS THAN 70 PER CENT OF ENROLLED STUDENTS COMPLETED THE QUESTIONNAIRE
      ***********************************************************************************************
```

AGAIN THE DISTRIBUTIONS FOLLOW

```
YSICS FACULTY, FALL 1971 - TEACHING SURVEY RESULTS
            INDIVIDUAL SECTIONS



ESTIONNAIRE NO. 2

      C O U R S E  4 2 0 * *  S E C T I O N  0 1 0 1
      ----------------------------------------------


      I N S T R U C T O R :   MCDONALD, F



      (ESTIMATE)      17  STUDENTS WERE ENROLLED IN THIS SECTION

                       0  STUDENTS PARTICIPATING COMPLETED THE QUESTIONNAIRE

                       1  STUDENTS PARTICIPATING CHOSE TO ABSTAIN

                      16  STUDENTS WERE NOT ACCOUNTED FOR

      (ESTIMATE)       0  PER CENT (   0/  17) OF STUDENTS ENROLLED COMPLETED THE QUESTIONNAIRE


                        *********************************************
                        *** THERE ARE NO RESULTS FOR THIS SECTION ***
                        *********************************************
```

E.2. Sample PATS Output for an Aggregate (Showing all Three Possible Weightings)

(p.E 2.3 shows a more complicated aggregate having many components)

```
PHYSICS FACULTY, FALL 1971  -  TEACHING SURVEY RESULTS                                    PAGE 113
                    ALL AGGREGATES                                                        01/26/72


QUESTIONNAIRE NO.


         A G G R E G A T E   N O .  ABC*   :  PHYSICS  PQR*
         ----------------------------------------------------------------------------


         C O M M E N T S :     ***IGNORE THE MIDDLE SET OF DISTRIBUTIONS - WEIGHTED BY SECTIONS ***
         ---------------
                                  SINCE  L    AND  M     ARE EACH IMPROPERLY COUNTED AS 2 SECTS.


                           3  SECTIONS/AGGREGATES ARE INCLUDED IN THIS AGGREGATE
                                  OUT OF A POSSIBLE   3 (SEE LIST BELOW)

         (ESTIMATE)       18  STUDENTS WERE ENROLLED IN THESE INCLUDED SECTIONS/AGGREGATES, OF WHICH

                          15  STUDENTS PARTICIPATING COMPLETED THE QUESTIONNAIRE

                           0  STUDENTS PARTICIPATING CHOSE TO ABSTAIN

                           3  STUDENTS WERE NOT ACCOUNTED FOR

         (ESTIMATE)       83  PER CENT (  15/  18) OF STUDENTS ENROLLED COMPLETED THE QUESTIONNAIRE


         THE FOLLOWING SECTIONS/AGGREGATES ARE INCLUDED IN THIS AGGREGATE :
        ---------------------------------------------------------------------

     1   COURSE  PQR    SECTION    101  INSTRUCTOR   K
     2   AGGREGATE  L   (  2 SECTIONS)  PHYSICS   PQR - instructo. L
     3   AGGREGATE  M   (  2 SECTIONS)  PHYSICS   PQR - instructor M
```

*(names + numbers have been "censored")

```
PHYSICS FACULTY, FALL 1971  -  TEACHING SURVEY RESULTS                                                    PAGE 114
                     ALL AGGREGAIES                                                                        01/26/72


QUESTIONNAIRE RESULTS FOR AGGREGATE NO.  ABC     PHYSICS  PQR
---------------------------------------------------------------------------------------

THE NUMBERS BELOW ARE PERCENTAGES OBTAINED BY                                  QUESTIONNAIRE NO.  6
WEIGHIING THE INCLUDED SECTIONS AS INDICATED.

QUEST   I             EACH STUDENT                I            EACH SECTION               I   EACH INCLUDED SECTION/AGGREGATE     I
NUMB    I           WEIGHTED EQUALLY              I          WEIGHTED EQUALLY             I   LISTED ABOVE WEIGHTED EQUALLY       I
        I     A      B      C      D      E      F I    A      B      C      D      E      F I    A      B      C      D      E      F I
-------I-------------------------------------------I-------------------------------------------I-------------------------------------------I
   1    I   86.7   13.3     .0     .0     .0     .0 I  88.4   11.7     .0     .0     .0     .0 I  86.7   13.3     .0     .0     .0     .0 I
   2    I   86.7   13.3     .0     .0     .0     .0 I  83.4   16.7     .0     .0     .0     .0 I  86.7   13.3     .0     .0     .0     .0 I
   3    I   33.3   40.0   13.3     .0     .0   13.3 I  46.7   34.7   10.7     .0     .0    8.0 I  33.3   40.0   13.3     .0     .0   13.3 I
   4    I     .0   13.3   60.0   20.0    6.7     .0 I    .0   15.0   59.4   20.7    5.0     .0 I    .0   13.3   60.0   20.0    6.7     .0 I
   5    I   20.0   46.7   20.0   13.3     .0     .0 I  13.0   52.4   24.0   10.7     .0     .0 I  20.0   46.7   20.0   13.3     .0     .0 I
   6    I   46.7   33.3   13.3     .0    6.7     .0 I  52.0   30.7   13.4     .0    4.0     .0 I  46.7   33.3   13.3     .0    6.7     .0 I
   7    I   86.7     .0    6.7     .0     .0    6.7 I  92.0     .0    4.0     .0     .0    4.0 I  86.7     .0    6.7     .0     .0    6.7 I
   8    I   33.3   33.3   26.7     .0    6.7     .0 I  39.0   37.4   18.7     .0    5.0     .0 I  33.3   33.3   26.7     .0    6.7     .0 I
   9    I   20.0   33.3   33.3     .0    6.7    6.7 I  13.0   33.4   44.7     .0    4.0    5.0 I  20.0   33.3   33.3     .0    6.7    6.7 I
  10    I   26.7   53.3   13.3    6.7     .0     .0 I  17.0   65.7   13.4    4.0     .0     .0 I  26.7   53.3   13.3    6.7     .0     .0 I
  11    I   13.3   20.0   40.0     .0   20.0    6.7 I   9.0   35.0   39.0     .0   12.0    5.0 I  13.3   20.0   40.0     .0   20.0    6.7 I
  12    I   20.0   33.3   26.7     .0   13.3    6.7 I  14.0   40.7   22.0     .0   16.7    6.7 I  20.0   33.3   26.7     .0   13.3    6.7 I
  13    I   26.7   53.3     .0     .0     .0   20.0 I  41.7   45.4     .0     .0     .0   13.0 I  26.7   53.3     .0     .0     .0   20.0 I
  14    I   33.3   26.7   13.3     .0     .0   26.7 I  28.0   27.4    8.0     .0     .0   36.7 I  33.3   26.7   13.3     .0     .0   26.7 I
  15    I   13.3   33.3    6.7   13.3   13.3   20.0 I   8.0   30.7   10.0   13.4    8.0   30.0 I  13.3   33.3    6.7   13.3   13.3   20.0 I
  16    I   33.3    6.7   33.3     .0    6.7   20.0 I  28.0    5.0   31.3     .0    4.0   31.7 I  33.3    6.7   33.3     .0    6.7   20.0 I
  17    I   20.0     .0   13.3   13.3    6.7   46.7 I  29.0     .0    8.0   13.4    6.7   43.0 I  20.0     .0   13.3   13.3    6.7   46.7 I
  18    I   13.3   40.0   33.3    6.7    6.7     .0 I   9.0   49.0   31.3    6.7    4.0     .0 I  13.3   40.0   33.3    6.7    6.7     .0 I
  19    I   26.7   20.0   33.3    6.7    6.7    6.7 I  18.0   30.0   31.3    6.7    4.0   10.0 I  26.7   20.0   33.3    6.7    6.7    6.7 I
  20    I    6.7     .0     .0     .0     .0   93.3 I   5.0     .0     .0     .0     .0   95.0 I   6.7     .0     .0     .0     .0   93.3 I
  21    I     .0     .0     .0     .0     .0  100.0 I    .0     .0     .0     .0     .0  100.0 I    .0     .0     .0     .0     .0  100.0 I
  22    I   13.3     .0     .0     .0     .0   86.7 I  11.7     .0     .0     .0     .0   88.4 I  13.3     .0     .0     .0     .0   86.7 I
  23    I     .0     .0     .0     .0     .0  100.0 I    .0     .0     .0     .0     .0  100.0 I    .0     .0     .0     .0     .0  100.0 I
  24    I    6.7     .0     .0     .0     .0   93.3 I   4.0     .0     .0     .0     .0   96.0 I   6.7     .0     .0     .0     .0   93.3 I
  25    I     .0    6.7     .0     .0     .0   93.3 I    .0    6.7     .0     .0     .0   93.4 I    .0    6.7     .0     .0     .0   93.3 I
  26    I   13.3     .0     .0     .0     .0   86.7 I   8.0     .0     .0     .0     .0   92.0 I  13.3     .0     .0     .0     .0   86.7 I
  27    I   13.3     .0     .0     .0     .0   86.7 I   9.0     .0     .0     .0     .0   91.0 I  13.3     .0     .0     .0     .0   86.7 I
  28    I     .0     .0     .0     .0     .0  100.0 I    .0     .0     .0     .0     .0  100.0 I    .0     .0     .0     .0     .0  100.0 I
  29    I   20.0     .0     .0     .0     .0   80.0 I  13.0     .0     .0     .0     .0   87.0 I  20.0     .0     .0     .0     .0   80.0 I
  30    I     .0     .0     .0     .0     .0  100.0 I    .0     .0     .0     .0     .0  100.0 I    .0     .0     .0     .0     .0  100.0 I
  31    I   40.0     .0     .0     .0     .0   60.0 I  48.0     .0     .0     .0     .0   52.0 I  40.0     .0     .0     .0     .0   60.0 I
  32    I   40.0     .0     .0     .0     .0   60.0 I  32.0     .0     .0     .0     .0   68.0 I  40.0     .0     .0     .0     .0   60.0 I
  33    I   33.3     .0     .0     .0     .0   66.7 I  26.4     .0     .0     .0     .0   73.7 I  33.3     .0     .0     .0     .0   66.7 I
  34    I   53.3     .0     .0     .0     .0   46.7 I  53.7     .0     .0     .0     .0   46.4 I  53.3     .0     .0     .0     .0   46.7 I
  35    I   33.3     .0     .0     .0     .0   66.7 I  25.7     .0     .0     .0     .0   74.3 I  33.3     .0     .0     .0     .0   66.7 I
```

THIS ACTUALLY CONTINUES

E2.2

This shows the first "contents" page of the output for a more complicated aggregate - notice the "forced" and "team-taught" components

```
QUESTIONNAIRE NO.  2


          A G G R E G A T E   N O .  0 0 9 5  :   ALL PHYSICS SERVICE COURSES (NON-HONORS)
          -----------------------------------------------------------------------------------------



                           11  SECTIONS/AGGREGATES ARE INCLUDED IN THIS AGGREGATE
                                     OUT OF A POSSIBLE  13 (SEE LIST BELOW)
          (ESTIMATE)     1220  STUDENTS WERE ENROLLED IN THESE INCLUDED SECTIONS/AGGREGATES, OF WHICH

                          733  STUDENTS PARTICIPATING COMPLETED THE QUESTIONNAIRE

                            5  STUDENTS PARTICIPATING CHOSE TO ABSTAIN

                          482  STUDENTS WERE NOT ACCOUNTED FOR

          (ESTIMATE)       60  PER CENT ( 733/1220) OF STUDENTS ENROLLED COMPLETED THE QUESTIONNAIRE


        ****************************************************************************************
        ***** W A R N I N G : LESS THAN 70 PER CENT OF ENROLLED STUDENTS COMPLETED THE QUESTIONNAIRE **
        ****************************************************************************************


         THE FOLLOWING SECTIONS/AGGREGATES ARE INCLUDED IN THIS AGGREGATE :
         -------------------------------------------------------------------

      1   COURSE   11      SECTION    200  INSTRUCTOR BERG

      2   COURSE   11      SECTION    300  INSTRUCTOR LENCHEK

      3   COURSE   30      SECTION    401  INSTRUCTOR PEREIRA

      4   COURSE   31      SECTION    100  INSTRUCTOR KORENMAN

      5   COURSE   32      SECTION    200  INSTRUCTOR MACDONALD
                                           (THE ABOVE ENTRY WAS FORCED ACCEPTABLE
                                           IN SPITE OF INSUFFICIENT RESPONSE.)
      6   COURSE   32      SECTION    101  INSTRUCTOR MINOR

      7   COURSE  153      SECTION    101  INSTRUCTOR MCDONALD,F.

      8   COURSE  153      SECTION    201  INSTRUCTOR CHANG,C.Y.

      9   COURSE  153      SECTION    301  INSTRUCTOR COPLAN

     10   COURSE  153      SECTION    401  INSTRUCTOR GLOECKLER

     11   AGGREGATE   40   (  1 SECTIONS)  PHYSICS 30 GOLDBERG AND S.SMITH-------TEAM TAUGHT

         THE FOLLOWING SECTIONS/AGGREGATES WERE REJECTED DUE TO INSUFFICIENT RESPONSE :
         -------------------------------------------------------------------------------

      1   COURSE   10      SECTION   1000  INSTRUCTOR POULTNEY

      2   COURSE   26      SECTION    101  INSTRUCTOR LAYMAN
```

APPENDIX F. SAMPLE AGGFORM COMPUTER RUN DECKS

The following examples, taken and carefully studied in sequence and in conjunction with chapter 5 and Appendix C, should provide illustrations of most points, including tape handling, print file creation, @ SYMming (i.e. printing) output, etc.

1. Throughout these examples, all material in script represents "interpretation" or explanation, and does not form part of the actual run deck.
2. An ' in column 1 represents a 7/8 punch, that is @.
3. The format of run and password cards may change with time, and naturally must be the current version. Note the time and page estimates!
4. Take special attention of the note on p. F 10!
5. The term FASTRAND is used colloquially to refer to all drum-type mass storage on the 1108.

Brief Summary of the Contents of this Appendix

F.1. If one wishes to obtain quickly only a copy (or copies) of individual sections, to serve the same purpose as INITPRT, and using the DATAREAD output file as input, one proceeds as in F.1. The data can physically be either cards forming part of the run deck, or on tape, or be on an 1108 FASTRAND file. All three possibilities are illustrated. (As a somewhat superfluous test, we print "all aggregates"--which becomes an print out. This could be removed by changing the print control number to 00001. and deleting the first title card "AGGREGATES").

F.2. This shows how to take card output of DATAREAD, and put it into an 1108 FASTRAND file.

F.3, F.4, F.5. These 3 examples show a sequence of 3 executions of AGGFORM, which implement the hierarchical tree of Appendix C.

F.3 creates a printfile PFSECT for all individual sections (equivalent to INITPRT), and also a temporary printfile for aggregates made in that first execution. One copy of PFSECT is SYMmed out (printed), and one copy of the temporary file is also automatically printed.

F.4 creates another printfile PFAGGS which contains all aggregates computed so far (i.e. executions 1 and 2), and one copy of this is SYMmed out (printed) as a check.

F.5 overwrites onto PFAGGS, so that it now contains all aggregates (since this is the last execution). It also creates a printfile PFMULT for multiplemania. Since this file is likely to exceed 250 tracks one cannot be sure that it can be kept on the 1108 FASTRAND. Hence this file is also copied onto a tape as a safety measure. Further, a diagnostic @ PRT,F PFMULT is used to determine the actual size of this file.

F.6 shows how to obtain more printed copies of printfiles at any later time, provided that these files have been maintained. (At present this requires that they be assigned at least every 20 days, by simply using @ ASG,AX PTSECT for PTSECT, etc.)

F.7 shows how to obtain further printed copies of a printfile which is stored on tape.

When a set of runs has been completed, it is wise to save copies of all the printfiles on a tape. F.5 shows how to write from FASTRAND onto TAPE. One might use a tape named TAPE, and then use @COPY,M PFSECT,TAPE @COPY,M PFAGGS, TAPE @ COPY,M PFMULT,TAPE, etc. Further one might make both 7 track and 9 track versions for safety. Naturally one should also SAVE the output file tape OUT of the last execution, which contains all (binary) records. We do not give a complete description of tape handling.

F.1. A First Execution Run which does not make aggregates. Used to obtain final printed section output prior to further executions which do make aggregates.

```
'RUN PTA,205271KACSER,KACSER,2,100          - Run card
'PASSWD ABCDEF                              - ABCDEF represents password
'SYM PRINT$,,PR2                            - trick to get this printout on printer 2
'MSG THIS WILL SYM ABOUT 1000 PAGES ON PR 2                       }
'MSG  PLEASE CHECK TOP AND BOTTOM MARGINS AND RIBBON              } - a useful
'MSG    ***********  THANK YOU  - C KACSER - 205271KACSER         }   courtesy
'ASG,AX KACSER*PATSY. - obtaining the program file PATSY, assumed to be on
'USE P.,KACSER*PATSY.   FASTRAND. (cf Section 5.14,p.5.25).  KACSER is the assumed
  either                                                          qualifier.
'ASG,AX PTDATA.        - if output file of DATAREAD, here called PTDATA, is on FASTRAND.
  or
'ASG,T PTDATA,8C,STUV N -if output file of DATAREAD, here called PTDATA, is on tape STUV.
  or NOTHING           -if output file of DATAREAD is on punched cards
'ASG,T OUT,8C,SAVER
'USE 11,OUT                                 - output of AGGFORM1 to be on a tape SAVER.
'DELETE,C PTSECT        }                   - preparing a FASTRAND file PTSECT for
'ASG,CPX PTSECT,F/1//250 }                    the"printed"section output
'USE 23,PTSECT
'XQT P.AGGFORM1
PHYSICS TEACHING ASSISTANTS, FALL 1971 - TEACHING SURVEY RESULTS - Overall title
TAPE
-99.      25.               1.
2I3,I2/13X,I1,7X,I9,6X,I3,7X,I3,15X,I1,7X,I1/10X,4A6,7X,6A6/5A6,A4
SELECT
END SELECT
BLOC1
20001.                      1971.     3.        .5        .51       .7
AGGREGATES                            - first printfile title card (actually "empty")
INDIVIDUAL SECTIONS - INPUT DATA      - second printfile titlecard
END BLOC1
END PASS
  either
'ADD PTDATA.  - if DATAREAD output file, called PTDATA, was either on FASTRAND or tape.
  or
PUNCHED IBM CARDS, which are the punched output of DATAREAD, if DATAREAD output was punched.
-99
  }
  }  3 blank cards  - THIS IS CRUCIAL!
  }
ALL DONE
'FREE IN
'FREE OUT
'FREE PTSECT           prints section data on printer #2,                   output wanted
'SYM,U PTSECT.,,PR2  -{repeat this card as many times as copies of printed section /
'PMD                                        - POSTMORTEM DUMP - useful if execution
'FIN                   END                    goes wrong - but optional
```

F.2. Setting Up a Data File (PTDATA) from card output of DATAREAD.

```
'RUN PTA,205-01-002,KACSER,2,200 — new version required
'ASG,CPX PTDATA.                    + Password
'DATA,IL PTDATA.
   }
   } "Data" cards here, with no blank cards
   }
'END
'FIN                   END
```

F.3. A First Execution Run with Aggregates. This and the subsequent runs correspond to the heirarchical tree of Appendix C.

```
'RUN PF.205271KACSER,KACSER,10,1000     - RUN card, note time and pages limits
'PASSWD ABCDEF                          - ABCDEF represents password
'SYM PRINT$,,PR2                        - trick to get this printout on printer 2
'MSG THIS WILL SYM ABOUT 1000 PAGES ON PR 2
'MSG  PLEASE CHECK TOP AND BOTTOM MARGINS AND RIBBON      a useful courtesy
'MSG     ************  THANK YOU  - C KACSER - 205271KACSER          tape.
'ASG,T OUT,8C,SAVER                     - output file of AGGFORM1 to be on SAVER
'USE 11,OUT
'ASG,AX KACSER*PATSY.   - obtaining the program from FASTRAND, cf App. F.1.
'USE P.,KACSER*PATSY.
  either
'ASG,AX PFDATA          - if output file of DATAREAD, here called PFDATA, is on FASTRAND
  or
'ASG,T PFDATA,8C,STUV N - if output file of DATAREAD is on tape STUV.
  or NOTHING            - if output file of DATAREAD is on punched cards.
'DELETE,C PFSECT                        - preparing a FASTRAND file PFSECT for
'ASG,CPX PFSECT,F/1//250                  the "printed" section output.
'USE 23,PFSECT.
'XQT P.AGGFORM1
 PHYSICS FACULTY, FALL 1971 - TEACHING SURVEY RESULTS - Overall title
TAPE
-99.       25.              1.
2I3,I2/13X,I1,7X,I9,6X,I3,7X,I3,15X,I1,7X,I1/10X,4A6,7X,6A6/5A6,A4
SELECT
AND 1TEST
INTERVAL  1008.                           MARTIN
AND 2TEST
INTERVAL  1008.                           PECHAC
AND 3TEST
INTERVAL  -4.       7.        7.
AND 3TEST
INTERVAL  -6.       285.      285.
AND 3TEST
INTERVAL  -7.       101.      101.
AND 4TEST  7010.
INTERVAL  -4.       7.        7.
AND 4TEST
INTERVAL  -6.       285.      285.
AND 4TEST
INTERVAL  -7.       102.      102.
AND 5TEST  7020.
INTERVAL  -4.       7.        7.
AND 5TEST
INTERVAL  -6.       285.      285.
AND 5TEST
INTERVAL  -7.       103.      103.
AND 6TEST
INTERVAL  -6.       181.      181.
AND 7TEST
INTERVAL  -6.       181.      182.
AND 8TEST
INTERVAL  -6.       283.      283.
AND 9TEST
INTERVAL  -6.       283.      284.
AND 10TEST
TEST      7.
TEST      9.
AND 11TEST
INTERVAL  -6.       410.      411.
```

PROGRAM CONTINUES ON NEXT PAGE

```
AND 12TEST
INTERVAL  -6.       421.      422.
AND 13TEST
TEST      11.
TEST      12.
AND 14TEST
INTERVAL  -4.       3.        3.
AND 14TEST
INTERVAL  -6.       405.      499.
AND 15TEST
TEST      14.
AND 15TEST
NOT TEST  13.
AND 16TEST
TEST      10.
TEST      14.
AND 17TEST  7030.
INTERVAL  -4.       7.        7.
AND 17TEST
INTERVAL  -6.       285.      285.
AND 17TEST
INTERVAL  -7.       104.      104.
AND 18TEST  7100.
INTERVAL  -4.       7.        7.
AND 18TEST
INTERVAL  -6.       365.      365.
AND 18TEST
INTERVAL  -7.       101.      101.
AND 19TEST 7110.
INTERVAL  -4.       7.        7.
AND 19TEST
INTERVAL  -6.       365.      365.
AND 19TEST
INTERVAL  -7.       102.      102.
AND 20TEST  7120.
INTERVAL  -4.       7.        7.
AND 20TEST
INTERVAL  -6.       365.      365.
AND 20TEST
INTERVAL  -7.       103.      103.
END SELECT
BLOC1
20001.                        1971.    3.         .5        .51       .7
AGGREGATES              - first printfile title card
INDIVIDUAL SECTIONS     - second printfile title card
AGGREGATE 6010.     4.        1.                    2.                1.
PHYSICS 429/621 -  MARTIN
 THIS APPREARS AS 2 SECTIONS, BUT IT IS REALLY ONE SECTION.
 THE UNDERGADUATES AND GRADUATES ARE COUNTED AS S5PARATE SECTIONS.
AGGREGATE 6020.     4.        2.                   2.                 1.
PHYSICS 429/621 -   PECHACEK
THIS APPEARS AS 2 SECTIONS, BUT IT IS REALLY ONE SECTION.
THE UNDERGRADUATES AND GRADUATES ARE COUNTED AS S5PARATE SECTIONS
AGGREGATE 7000.     1.        3.         3.        2.                 2.
PHYSICS 285   SEC   101
NOTE THAT STEINBERG'S STUDENTS ARE SCRAMBLED AND DO NOT NECESSARILY BELONG HERE
THIS AGGREGATE IS COMPUTED AND IF NECESSARY FORCED IN ORDER TO FORM LATER ONES
AGGREGATE 7010.     1.        4.         4.        2.                 2.
PHYSICS 285   SEC   102
NOTE THAT STEINBERG'S STUDENTS ARE SCRAMBLED AND DO NOT NECESSARILY BELONG HERE
THIS AGGREGATE IS COMPUTED AND IF NECESSARY FORCED IN ORDER TO FORM LATER ONES
```

PROGRAM CONTINUES ON NEXT PAGE

```
AGGREGATE 7020.     1.        5.        5.        2.                  2.
PHYSICS 285   SEC   103
NOTE THAT STEINBERG'S STUDENTS ARE SCRAMBLED AND DO NOT NECESSARILY BELONG HERE
THIS AGGREGATE IS COMPUTED AND IF NECESSARY FORCED IN ORDER TO FORM LATER ONES
AGGREGATE 3000.               6.                                      6.
PHYSICS 181
AGGREGATE 3010.               7.                                      8.
PHYSICS 181/2' FIRST YEAR MAJOR SEQUENCE
AGGREGATE 3020.               8.                                      3.
PHYSICS 283
AGGREGATE 3030.               9.                                      4.
PHYSICS 283/4' SECOND YEAR MAJOR SEQUENCE
AGGREGATE 3040.               10.                                     12.
PHYSICS 181/2//283/4' FIRST AND SECOND YEAR MAJOR SEQUENCE
AGGREGATE 3050.               11.                                     3.
PHYSICS 410/411
AGGREGATE 3060.               12.                                     3.
PHYSICS 421/422
AGGREGATE 3070.               13.                                     6.
PHYSICS 410/1//421/2' THIRD YEAR REQUIRED MAJOR COURSES
AGGREGATE 3080.               15.                                     6.
PHYSICS MAJOR FOURTH YEAR ELECTIVES
AGGREGATE 3090.               14.                                     12.
THIRD AND FOURTH YEAR PHYSICS MAJOR
AGGREGATE 3100.               16.                                     24.
ALL UNDERGRAD PHYSICS MAJOR COURSES
AGGREGATE 7030.     1.        17.       17.       2.                  2.
PHYSICS 285   SEC   104
NOTE THAT STEINBERG'S STUDENTS ARE SCRAMBLED AND DO NOT NECESSARILY BELONG HERE
THIS AGGREGATE IS COMPUTED AND IF NECESSARY FORCED IN ORDER TO FORM LATER ONES
AGGREGATE 7100.     1.        18.                                     2.
PHYSICS  365  SECT. 101
AGGREGATE 7110.     1.        19.                                     2.
PHYSICS  365  SECT. 102
AGGREGATE 7120.     1.        20.                                     2.
PHYSICS  365  SECT. 103
END BLOC1
END PASS
 either
'ADD PFDATA.  - if DATAREAD output file, called PFDATA, was either on FASTRAND or tape.
 or
PUNCHED IBM CARDS, which are the punched output of DATAREAD, if DATAREAD output was punched.
-99
   }   3 blank cards
ALL DONE
'FREE OUT.
'FREE PFSECT.
'SYM,U PFSECT,,PR2  - repeat this card for each copy of printed section output wanted.
'PMD                - POSTMORTEM DUMP - useful if execution goes wrong, but optional.
'FIN
                        END
```

F.4. A Second Execution Run, following that of Appendix F.3 (hence a first execution of AGGFORM2). This again corresponds to the tree of Appendix C.

```
'RUN PF,205271KACSER,KACSER,12,1500   - RUN card, note time and pages limits!
'PASSWD ABCDEF                         -ABCDEF represents password
'SYM PRINT$,,PR2                       - trick to get all printout on printer 2
'MSG THIS WILL SYM ABOUT 1000 PAGES ON PR 2
'MSG  PLEASE CHECK TOP AND BOTTOM MARGINS AND RIBBON     } a useful
'MSG    ***********  THANK YOU  - C KACSER - 205271KACSER} courtesy
'ASG,AX KACSER*PATSY.                  - all programs are'presently'in this file.
'USE P.,KACSER*PATSY.                    (cf. App. F.1)
'ASG,T IN,8C,9553N       Output file tape of AGGFORM1 becomes input tape (#9553)
'USE 9,IN
'ASG,T OUT,8C,9363R      Output file of AGGFORM2 put onto tape (#9363, or use SAVER)
'USE 11,OUT
'DELETE,C PFAGGS                        - preparing a FASTRAND file PFAGGS for
'ASG,CPX PFAGGS,F/1//250                  the "printed" aggregate output.
'USE 15,PFAGGS
'XQT P.AGGFORM2
 PHYSICS FACULTY, FALL 1971  -  TEACHING SURVEY RESULTS - Overall title
TAPE
1971.     3.
SELECT
AND 1TEST
INTERVAL  -6.         121.       122.
AND 1TEST
INTERVAL   -4.          2.        2.
AND 2TEST
INTERVAL  -6.         262.       262.
AND 3TEST
INTERVAL  -6.         161.       161.
INTERVAL  -6.         262.       263.
AND 4TEST
INTERVAL  -6.         420.       420.
AND 5TEST
INTERVAL  -4.         2.         2.
AND 6TEST  7090.
INTERVAL  -6.         286.       286.
AND 7TEST  7040.
INTERVAL  1008.                              RICHAR
AND 7TEST
INTERVAL  -4.          7.          7.
AND 8TEST  7050.
INTERVAL  1008.                              STEINB
AND 9TEST  7060.
INTERVAL  -25.        7000.      7030.
AND 10TEST 3200.
INTERVAL  -6.         601.       602.
AND 11TEST 3210.
INTERVAL  -6.         604.       606.
AND 12TEST 3220.
INTERVAL  -6.         622.       623.
AND 13TEST 3230.
TEST        10.
TEST        11.
TEST        12.
AND 14TEST 3240.
INTERVAL  -6.         624.       898.
AND 15TEST  3110.
INTERVAL  -6.         271.       271.
INTERVAL  -6.         404.       404.
AND 16TEST  3120.
```

PROGRAM CONTINUES ON NEXT PAGE.

```
INTERVAL  -4.       3.        3.
AND 16TEST
INTERVAL  -6.       100.      498.
AND 16TEST
INTERVAL   -25.        0.        0.
AND 17TEST  3250.
TEST       13.
TEST       14.
AND 18TEST  3260.
TEST       16.
TEST       17.
AND 19TEST  6030.
INTERVAL  -25.      6010.     6020.
INTERVAL  1008.                         ZORN,
AND 19TEST
INTERVAL  -4.       6.        6.
AND 20TEST  7160.
INTERVAL  -25.      7100.     7120.
END SELECT
BLOC1
20100.                        1971.     3.        .5        .51       .7
EXECUTION 2 NEW AGGREGATES     - first printfile title card
EXECUTION 2 - ALL AGGS SO FAR  - second printfile title card
AGGREGATE 2000.               1.                                      3.
PHYSICS 121/2
AGGREGATE 2010.               2.                                      3.
PHYSICS 262
AGGREGATE 2020.               3.                                      5.
PHYSICS 161//262/3
AGGREGATE 2030.               4.                                      4.
PHYSICS 420
AGGREGATE 2040.               5.                                      14.
ALL PHYSICS SERVICE COURSES
AGGREGATE 7090.     4.        6.                                       1.
 PHYSICS 286
AGGREGATE 7040.     4.        7.                  1.                  1.
PHYSICS 285 --  RICHARD
SINCE THESE COURSES WERE TEAM TAUGHT, THIS DESCRIPTION IS BASED ON A HALF-VIEW
AGGREGATE 7050.     4.        8.        8.        2.                  1.
PHYSICS 285 --- STEINBERG
SINCE THESE COURSES WERE TEAM TAUGHT, THIS DESCRIPTION IS BASED ON A HALF-VIEW
THIS AGGREGATE IS COMPUTED AND IF NECESSARY FORCED IN ORDER TO FORM LATER ONES
AGGREGATE 7060.               9.        9.                            2.
PHYSICS 285
AGGREGATE 3200.               10.                                     3.
PHYSICS 601/2
AGGREGATE 3210.               11.                                     3.
PHYSICS 604/606
AGGREGATE 3220.               12.                                     3.
PHYSICS 622/3
AGGREGATE 3230.               13.                                     9.
PHYSICS 601/2//604//606//622/3 FIRST YEAR GRADUATE COURSES
AGGREGATE 3240.               14.                                     12.
ALL UPPER LEVEL PHYSICS GRADUATE COURSES
AGGREGATE 3110.               15.                                     2.
(GENERAL) PHYSICAL SCIENCES COURSES
AGGREGATE 3120.               16.                                     26.
ALL UNDERGRADUATE PHYSICS MAJOR AND PHSYICAL SCIENCES MAJOR COURSES
AGGREGATE 3250.               17.                                     21.
ALL PHYSICS GRADUATE COURSES
AGGREGATE 3260.               18.                                     47.
```

PROGRAM CONTINUES ON NEXT PAGE.

```
ALL PHYSICS MAINSTREAM UNDERGRAD (INCL. G.P.S.) AND GRADUATE COURSES
AGGREGATE 6030.               19.                    2.                3.
PHYSICS 429//621 'GRADUATE' PHYSICS LAB
***IGNORE THE MIDDLE SET OF DISTRIBUTIONS - WEIGHTED BY SECTIONS ***
   SINCE MARTIN AND PECHACEK ARE EACH IMPROPERLY 3OUNTED AS 2 SECTS.
AGGREGATE 7160.               20.                                      2.
PHYSICS 365
END BLOCK
END PASS
ALL DONE
'FREE IN.
'FREE OUT.
'FREE PFAGGS
'SYM,U PFAGGS...PR2 - will print one copy of "all" aggregates, but since one more exec-
'PMD  - optional            ution, still needed, this will not be complete! A useful check.
'FIN
                    END
```

Appendix Continues

F.5. A Third Execution Run following that of F.4, showing how to store Multiplemania.

```
'RUN PF,205271KACSER,KACSER,12,1500       - RUN card
'PASSWD ABCDEF                            - ABCDEF represents password
'SYM PRINT$,,PR2                          - trick to get "all" printout on printer 2
'MSG THIS WILL SYM ABOUT 1000 PAGES ON PR 2                          }
'MSG  PLEASE CHECK TOP AND BOTTOM MARGINS AND RIBBON                  }  - a useful
'MSG    ***********  THANK YOU  - C KACSER - 205271KACSER            }    courtesy
'ASG,AX KACSER*PATSY.                     - all programs are "presently" in this file.
'USE P.,KACSER*PATSY.                              (cf. App. F.1)
'ASG,T IN,8C,9363N    - Output file tape of previous execution becomes input tape #9363
'USE 9,IN
'ASG,T OUT,8C,9870R   - Output file of this execution put onto tape (#9870, or use SAVER)
'USE 11,OUT
'DELETE,C PFAGGS              - preparing a FASTRAND file PFAGGS for the "printed" aggre-
 ASG,CPX PFAGGS,F/1//250        gate output.  Notice that its previous contents are deleted
 USE 15,PFAGGS.
'DELETE,C PFMULT              - preparing a FASTRAND (temporary) file PFMULT for multiple-
 ASG,CPX PFMULT,F/1//999        mania.  Notice its size!  Hence it cannot be permanent.
 USE 13,PFMULT.
'XQT P.AGGFORM2
 PHYSICS FACULTY, FALL 1971  -  TEACHING SURVEY RESULTS
 APE
1971.      3.
SELECT
 ND 1TEST  7140.
 NTERVAL  1008.                            RISK
AND 2TEST 7150.
 NTERVAL  1008.                            ROUSH
 ND 3TEST 7200.
INTERVAL  -25.       7000.     7030.
INTERVAL  -25.       7100.     7120.
 NTERVAL  1008.                            ROSENB
AND 3TEST
INTERVAL  -4.        7.        7.
 ND 4TEST 1000.
 NTERVAL  -4.        1.        1.
END SELECT
 LOC1
 1100.                         1971.    3.        .5        .51        .7
 EXECUTION 3 - NEW AGGREGATES           - Printout title card for first printfile
                                        - Blank printout title for second printfile
 ALL AGGREGATES                         - Printout title card for third printfile
AGGREGATE 7140.      4.        1.                 1.                   1.
PHYSICS 365 -        RISK
SINCE THESE COURSES WERE TEAM TAUGHT, THIS DESCRIPTION IS BASED ON A HALF-VIEW.
AGGREGATE 7150.      4.        2.                 1.                   1.
PHYSICS 365 -        ROUSH
SINCE THESE COURSES WERE TEAM TAUGHT, THIS DESCRIPTION IS BASED ON A HALF-VIEW.
AGGREGATE 7200.                3.                                      5.
PHYSICS 285/236//365  STRUCTURED UNDERGRAD LAB COURSES
AGGREGATE 1000.                4.                                      4.
 LL GENERAL PHYSICS COURSES
END BLOC1
END PASS
 LL DONE
'PMD
'FREE IN.
'FREE OUT.
```

PROGRAM
CONTINUES.

```
                                                                                      copied.
'ASG.T MULT.8C,SAVER - assigning a tape (SAVER) onto which MULTIPLEMANIA will be
'COPY PFMULT,MULT    - copies FASTRAND PFMULT onto permanent tape MULT.
'MARK MULT                               - tape handling instruction
'REWIND MULT.                            -   "      "         "
'FREE PFMULT.
'FREE MULT
'FREE PFAGGS.
'SYM,U PFAGGS,,PR2 - repeat this card for each copy of aggregate printout wanted*.
'SYM,U PFMULT,,PR2 - repeat this card for each copy of multiplemania printout wanted*.
'PRT,F PFMULT.     - a diagnostic to find out the size of PFMULT.  If less than 251
'PMD - optional      tracks, it will be saved on FASTRAND, if more it will be destroyed
'FIN          END    and hence only exist on the tape MULT.
```

* When SYMming output like this, one can overwhelm the C.S.C.printer, so be considerate.

OTE It is probably worthwhile to get all copies of PFMULT = MULTIPLEMANIA in this execution run, since otherwise one will have to copy it off tape MULT. But then do not make more than one copy of PFAGGS at the same time! See below for how to make later copies.

F.6. Obtaining More Printed Copies of Output. (This example prints PTSECT.)

```
'RUN PTA,205-01-271,KACSER,1,4000 - Run card, note pages!  }
'MSG THIS WILL SYM ABOUT 1000 PAGES ON PR 2                 } a worthwhile
'MSG  PLEASE CHECK TOP AND BOTTOM MARGINS AND RIBBON        } courtesy
'MSG THANK YOU  -  C KACSER, 205-01-271                     }
'ASG,AX PTSECT.
'FREE PTSECT.
'SYM,U PTSECT.,,PR2  - repeat this card for each copy wanted (but see note above)
'FIN

                         END
```

F.7. Obtaining More Copies of Multiplemania, if it is too large for FASTRAND.
(But first check whether the file PFMULT from F5 has satisfactory status, as indicated by the output from PRT,F PFMULT.; in which case proceed as in F.6.)

```
'RUN PF,205-01-002,KACSER,10,1500 - Run card, note time and pages!
'ASG,T MULT,8C,XXXXN - XXXX represents the tape number
'DELETE,C PFMULT
'ASG,AX PFMULT.,F/1//999
'COPY MULT,PFMULT
'FREE MULT
'FREE PFMULT
'SYM,U PFMULT,,PR2 - repeat this card for each copy wanted (but see note above)
'DELETE,C PFMULT.
'FIN
'FIN                     END
```

APPENDIX G -- SUNDRY ADMINISTRATIVE ITEMS

APPENDIX G.1. AGGFORM Output Distribution List (Physics)

1. Physics, Faculty

A: All Sections, All Aggregates, All Questionnaires:

i public display
ii chairman of department
iii associate chairman
iv teaching excellence committee
v PATS administrator
vi departmental administrator

B: Individual Sections plus all Aggregates Which Contain These (i.e. hierarchies), plus Appropriate Questionnaires:

i to the individual
ii &
iii to his file (two copies)

C: All Sections within the Jurisdiction of Course Committees or Subcommittees, plus all Aggregates Containing These, plus Appropriate Questionnaire:

i To course committees (e.g. Undergraduate Major Committee)
ii To subcommittees (e.g. Phys 181-284 sequence)

2. Physics, T/A's

A: All Sections, All Aggregates, All Questionnaires:

i public display
ii chairman of department
iii associate chairman of department
iv teaching excellence committee
v PATS administrator
vi departmental administrator
vii T/A assignment committee chairman
viii T/A records (office)

B: Individual Sections plus all Aggregates Which Contain These (i.e. hierarchies), plus Appropriate Questionnaire:

i to the individual T/A
ii to his file

C: All Sections within Jurisdiction of Course Committees or Subcommittees, plus all Aggregates Containing These, plus Appropriate Questionnaires:

i To course committees (e.g. Elementary Course Committee)
ii To subcommittees (e.g. Phys 161, 262, 263 subcommittee)

D: All Sections Supervised by One Professor, plus all Aggregates Containing These, plus Appropriate Questionnaire:

i to the professor

G.2. Cover Memo Used with AGGFORM Printout Distribution

UNIVERSITY OF MARYLAND

Department of Physics and Astronomy

INTRAMURAL

To: All Faculty and Teaching Assistants,including Course Committee Chairman, etc.

From: Howel Pugh, Chairman Teaching Excellence Committee, and C. Kacser in Charge of Questionnaire processing.

Subject:

Date: November 9, 1971

REF: Attached Spring 71 questionnaire final output (but see below)

1. Attached Materials: Herewith in a packet
   1. A copy of the appropriate questionnaire.
   2. Copies of all single sections with which you should be concerned.
   3. Copies of all individual T/A aggregates as appropriate.
   4. Copies of all aggregates which include reference to either 2 or 3 above.

Items 3 and 4 "aggregates" should be self explanatory. On individual sections a warning is printed if the participation falls below 70%. Such sections are rejected in an aggregate if the participation falls below 50%. An aggregate is not computed if the participation within the aggregate falls below 51%. This 50% cutoff criterion is very low, but a higher one (e.g., 70%) would cause too many aggregates to be rejected [participation was in fact low, probably due to the lateness of issuing the questionnaire--last full week of Spring 1971]. The effect of these rejection criteria is that an individual student's responses are considered possibly biased and hence rejected unless at least 50% of the students in his section also respond; an individual section's responses are similarly completely rejected in an aggregate unless at least 51% of the sections of a single T/A are accepted; and individual lecture sections or T/As within higher aggregates are again rejected completely in an aggregate unless at least 51% of these are accepted. Further information can be obtained from C. Kacser.

2. Comments: The comments made by students are available in Dr. Grigg's office. Please look at these.

3. Toll Room: All output will soon be available in the Toll Room.

4. The Fall 71 versions of the questionnaires are being prepared now. Only minor editing changes are contemplated except for questionnaire 5. If you have any suggestions or comments, please send them in writing to H. Pugh.

APPENDIX H - VERY MISCELLANEOUS ITEMS CONCERNING OPERATIONAL AND PROGRAMMING ASPECTS OF AGGFORM

H.1 The PQR Number

As discussed in section 3.8b, p. 3.15 (and also section 5.2.b, p. 5.1), there are three possible types of weighting which may arise when forming aggregates. If the PQR number is left blank on the aggregate control card (columns 61-70, cf. section 5.10.3.b, p. 5.22) then AGGFORM follows one specific standard scheme in computing these distributions. This choice, referred to as the "default" choice, was chosen as being the most natural prescription; but by setting other values for the PQR number one can achieve other prescriptions.

Recall that nominally the PQ & R distributions are defined as follows:

P - distribution: all included students weighted equally

Q - distribution: all included sections weighted equally

R - distribution: all included components weighted equally

There is no difficulty or choice as regards the meaning to be given to the P and Q definitions, but a little thought shows that the R distribution is not fully defined by the above. The PQR number enables the user to fully specify how he wants the R distribution to be computed if an R distribution is to be created.

An R - distribution is created (automatically) if the aggregate contains more than one component*, and at least 1 of those components itself contains more than one section (a "combination" counts as a single section, cf. section 5.2c, p5.2). That component will then necessarily "contain" both P and Q distributions, and may or may not also contain an R - distribution. In either case there may be other components of the aggregate which are single sections (and hence only have P distributions); and yet other components of the aggregate which contain more than one section (and hence themselves contain either P and Q; or P,Q and R distributions). So the question becomes "which distribution from each component should be used to form the R distribution of the final aggregate?" The PQR number specifies the choices one wishes to make. There are three possibilities readily available in AGGFORM (and other ones could be programmed as well). These are given in Table H.1.1 below.

---

* It is technically possible to form an aggregate which has only one component - but this is of no practical significance.

Table H.1.1. Values and Meanings of the PQR Number

PQR number of Aggregate	Distributions Present in Particular Component	Component Distribution Chosen for Weighting Into R Distribution
1	P	P
(≡0≡ "blank"	P and Q	P
≡default value) *	P,Q and R	P
2	P	P
	P and Q	Q
	P,Q and R	Q
3	P	P
	P and Q	Q
	P, Q and R	R

*This value is assigned if the PQR-number field on the aggregate control card is either left blank (and read as zero), or entered as zero, or as 1.

The primarily anticipated use of the R distribution was to compare instructors who had more than one section. This can be done by forming an aggregate of all complete descriptions (reduced type 4) of the instructors one wishes to compare. The R distribution then attempts to weight each instructor equally. Now for questions about the instructor's qualities it was felt that the best instructor's average to take was one in which each student responding was weighted equally. For that reason the automatic or default option for the PQR number (the one obtained if the user leaves the PQR field blank) is to take the P distribution from each component.

H.2 Format of the AGGFORM Output Tape Records

H.2.1. All AGGFORM output tapes consist of (binary) records in standard FORTRAN tape format. Each "record" is a group of words written by a single FORTRAN WRITE statement. Records are separated by end-of-record gaps. The output tapes consist of many records, the contents of which are described below.

H.2.2. Arrangement of Records

First record - the "tape identification label", discussed briefly in section 5.10.1.b (p. 5.14). This consists of three words. The first two are specified by the user on the print control card and are usually taken to be the year and the semester of the survey (see section 5.10.3.a, p. 5.20). The third word is always zero. Eg 1971. 3. 0. is used for Fall 1971. (This follows the SUMX standard form.)

Second and Third records - the "Directory" - see Appendix H.3. These two records may be very long, and contain entries for each section or aggregate, including ID number, title, etc., etc., etc. Comment cards and lists of components are stored only in the directory, not in the main records (see below).

Records 4 to (N+3) - Individual section records for the N inputted single sections (see below). These appear in the order in which they were originally assembled for DATAREAD.

Records (N+4) to (N+M+3) - Individual aggregate records for the M aggregates constructed so far (see below). These appear in ascending order of aggregate number.

(N+M+4)th Record - End record (SUMX standard form)

H.2.3 Structure of Individual Section or Aggregate Records

These records all follow one basic pattern, which has certain variations for the two main cases:--section or aggregate. Recall that many items apply equally to sections and to aggregates. Each record may consist of up to 1000 words; currently all records are 520 words or less. Table H.2.3.1 on the next page shows the contents of each word.

Table H.2.3.1 Format of Individual Section/Aggregate Records on Output Tapes

Words	Content	
	For section record	For aggregate record
1	No. of students enrolled	Same, but summed over included components
2	No. of non-abstaining responding students ("estimated")	Same, but summed over included components
3	# of questions	Same
4	Questionnaire No.	Same
5	ID No.	Zero
6	Course No.	Same, if still applicable, otherwise negative
7	Section No.	Same, if still applicable, otherwise negative
8-21	words 8-11: Instructor's name words 12-17: 35 character "comment" from section header card words 18-19: Not used word 20 : course No.* word 21 : section No.*	Aggregate "title"
22	Prof-T/A number (cf section 5.7.2, p. 5.10)	Same, if still applicable, otherwise negative
23	First digit of course No.	Same, if still applicable, otherwise negative
24	First digit of section No.	Same, if still applicable, otherwise negative
25	Zero	Aggregate number
26	Type No.	Same
27	Response percentage = 100x (word 2)/(word 1), cf section 5.2.g, p. 5.3)	100x (No. Included Components)/(No. of included + No. rejected components)
28	Unused	PQR Number
29	Unused	# of sections aggregated into this record
30	Unused	# of aggregates aggregated into this record

Table continues

---

*The redundant storing of these two words is used in AGGFØRM as a patch to get this information into the directory. The coding could be altered to do this more directly.

Table H.2.3.1 continued

Words	Content	
	For section record	For aggregate record
31	number of participating students who abstained ("estimated")	Same, but summed over included components
32	Course category (cf section 5.7.3, p. 5.10)	No. of copies required for multiplemania (cf section 5.6.2, p.5.8)
33	Reduced type No. (But see section H.5.2)	Same
34-40	Unused	Same
41-200	Percentage distributions	Percentage (P-) distributions, w'ted by students.
201-360	Numerical distributions (#s)	Percentage (Q-) distributions, w'ted by sections
361-520		Percentage (R-) distributions, w'ted by component, if applicable; otherwise not part of record.

H.2.4 Further explanations

All distributions (words 41-200, 201-360, 361-520) are entered in a standard format as follows. The first 2 words contain data for question 1, the second 2 words contain data for question 2, and the words 2n-1 and 2n contain data for question n. [As presently programmed, no more than 80 questions are allowed on any questionnaire.]

For each question there are six quantities a,b,c,d,e,f representing the number of, or the percentage of students who marked the responses a,b,c,d,e, or left a blank (≡f) respectively. These quantities have either integer or percentage values. The storage procedure is the same for both cases. The quantity is multiplied by 10 and any remaining fractional part is dropped. Thus for percentages, one place to the right of the decimal will be saved. These newly created integers, $\alpha,\beta,\gamma,\delta,\varepsilon,\phi$ are then stored in a packed format in the two words of the record for that question as $(\alpha \times 2^{24} + \beta \times 2^{12} + \gamma)$ and $(\delta \times 2^{24} + \varepsilon \times 2^{12} + \phi)$ respectively. Thus 872,51,12 is stored as $8720 \times 2^{24} + 510 \times 2^{12} + 120)$, and 5.1%, 1.3%, 72.4% is stored as $(51 \times 2^{24} + 13 \times 2^{12} + 724)$. The words for non-existent questions have the entry "0".

Notice that the "f" value is always stored separately and not deduced as being the number left over. Rounding errors will of course creep in when the aggregate percentage distributions are computed, and will be apparent in that $a + b + c + d + e + f$ will generally not be precisely 100.0. But all such errors are likely to be small.

H.3 Format of The Directory Records

H.3.1 Overall description

The directory was created for several reasons. First, it was difficult to allow for variable-length segments within the fixed-length, fixed-location type of record most useful in SUMX. (cf. Appendix H.4 immediately following.) Such segments were needed to accomodate the (variable number of) comment cards and the list of components for a given aggregate. Furthermore, it was necessary to have some information on each aggregate available in the computer core during execution; the inclusion of a table of contents at the beginning of the printout, for example, would be impossible without such a feature.

The directory in fact consists of 2 separate records. The first directory record, called DIR1, is a "map" of the second directory record DIR2. DIR2 contains the information pertinent to each section or aggregate, while DIR1 enables the various programs to locate this information.

The directory records are the two records on the tape which SUMX does not know about, and does not expect. Thus provision must always be made somewhere in the user's non-SUMX subroutines (e.g. his BLOC1), or in the subroutine TAPESR for moving the tape past the complete directory before allowing SUMX to start readi[illegible]tion aggregate records.

We saw in Appendix H.2 (immediately preceding) that the tape has a sequence of (N+M) records for each of the individual N sections and M aggregates created so far. These are arranged, in sequence, with the N sections first, in the order in which they were originally read in (i.e. were assembled for DATAREAD); followed by the M aggregates in order of ascending aggregate number.

In what follows, we will sometimes refer to the "nth section/aggregate record" or simply "the nth record". By this we mean that we start counting with the first section record as record no. 1, and so on through the section records, and into the aggregates, with the first aggregate being the (N+1)st record in this scheme.

H.3.2 DIR1 Record Format

DIR1 contains information about the location within DIR2 of the entry for the nth section/aggregate. It is of variable length, with a maximum of 550 words. Its structure is given in Table H.3.2.1 below.

Table H.3.2.1 DIR1 Record Format

Word	Contents
1	no. of words in DIR1
2	no. of words in DIR2
3	no. of section/aggregate records on the tape, i.e. (N+M)
4-17	Title for run (c.f. section 5.10, p. 5.12)
18	no. of section records (N)
19	no. of aggregate records (M)
20-50	not used
51	location in DIR2 of beginning of 1st section/aggregate entry (always 1)
52	location in DIR2 of beginning of 2nd section/aggregate entry (= 1 + no. of words in 1st entry)
53	....
..	....
50+n	location in DIR2 of beginning of nth section/aggregate entry (= 1 + no. of words in all prior entries)
....	....

H.3.3 DIR2 Record format

This is a variable location record, with a maximum of 20,000 words. It contains entries, in order, for each of the (N+M) sections/aggregates. These entries can be located by use of the information contained in DIR1. Each of the N section entries is 19 words long, and follows the format given in Table H.3.3.1 below.

The M aggregate entries have variable length, with a maximum length of 200 words each. They follow the format given in Table H.3.3.2 below.

The meaning of each of the contents in tables H.3.3.1 and H.3.3.2 should be reasonably self-evident. Many of the same contents also occur in Table H.2.3.1, where they are cross-referenced to Ch 5 for further explanation.

Table H.3.3.1 Individual Section Entry Format Within DIR2

Word	Contents
1	no. of pages on final printout for this section
2	not used
3-6	instructor's name
7-12	35 character "comment" from section header card
13-14	not used
15	course number
16	section number
17	type number (not reduced type number)
18	response percentage
19	questionnaire number

Table H.3.3.2 is on next page.

Table H.3.3.2 Individual Aggregate Entry Format Within DIR2

Word	Contents
1	[no. of pages on final printout for this aggregate] +100×[no. of copies wanted in multiplemania] +10000×[no. of included sections within all components within this aggregate, which either pass the cutoff criteria or are force-accepted]
2	Aggregate number
3-16	Aggregate "title"
17	type number (not reduced type)
18	response percentage
19	questionnaire number
20	NIC ≡ no. of included components, which either pass the cut-off criteria or are force-accepted
21	NRJ ≡ no. of "excluded" components (not including force-accepted components)
22	NFA ≡ no. of force-accepted components
23	NCC ≡ no. of "comment" cards (cf section 5.10.3.b, p. 5.22). This number includes both those externally inputted using comment cards, and also 2 comment cards internally created for any combination (reduced type 1). cf footnote on p. 5.22.
24 to 23+14×NCC	The NCC comment cards (14 words each)
[24+14×NCC] to [23+14×NCC+NRJ+NIC]	A sequential list of words generated from the entry number n of each of the ab initio eligible components for the aggregate. This includes both sections and aggregates. For each component, the word is taken as "n" for accepted components (which pass the cut-off criteria), is taken as "-n" if it is excluded, and as (n + 1000) if it is force-accepted.

H.4 Structure of the Program AGGFORM

The program was written around a skeleton provided by SUMX, a high energy physics (HEP) multipurpose sorting and data handling program. This program is described in "SUMX Version M-4" - by Dr. R. G. Glasser, in University of Maryland Department of Physics and Astronomy Technical Report #763, December 1967 (AEC-ORO-2504-116). This report may be obtained from the High Energy Physics Group in the Department.

Not all parts of HEP*SUMX are needed for PATS. Hence a separate program file KACSER*SUMX was made from parts of HEP*SUMX. This makes AGGFORM self-contained, and ensures that any subsequent changes in HEP*SUMX do not affect AGGFORM.

All program elements which were not part of HEP*SUMX and which had to be specially written for PATS are on a separate program file KACSER*PATSY. Both program files contain symbolic (FORTRAN), relocatable, and absolute elements. The symbolic elements of PATSY are fairly well "commented" in terms which should make sense to the reader of this report. This is not true for SUMX. Fortunately most changes which one might want to make to AGGFORM will only involve changes in PATSY, so that with care it should be possible to modify AGGFORM without changing SUMX. After any such changes, each changed symbolic element must be recompiled, to form a new relocatable element. Then all the programs must be remapped (@MAP), to form executable (absolute) programs. To successfully remap, one needs both the (recompiled) relocatable elements on PATSY, and the contents of SUMX, i.e. both must be on FASTRAND. Once such a mapping is carried out, the final executable absolute program will be on KACSER*AGGFORM.

It follows that, to perform executions of AGGFORM, one only needs to copy the absolute elements AGGFORM1 and AGGFORM2 from tape onto FASTRAND. This forms a minimal executable package.

However, to allow for possible modifications to AGGFORM, one must also keep both KACSER*SUMX and KACSER*PATSY on tape, and ideally have a backup copy of the symbolics in the form of cards.

Putting the above considerations together, one sees that the most useful arrangement is a single final tape, structured as follows. The final tape should have 3 separate files. These should be:

1. AGGFORM1 and AGGFORM2 absolute elements

2. PATSY; all symbolic, and relocatable, elements (absolute elements not necessary, optional)

3. SUMX; all symbolic and relocatable elements.

H.5 Other Miscellaneous Facts Concerning the Operation of AGGFORM

H.5.1 Incorporation of more input data (new input sections) during processing.

Suppose for some reason that Digitek cards have been produced for most sections, but that for some sections they are not yet available. Instead of delaying the initiation of the data processing while waiting for the data sets to be completed, one can proceed with those data sets already available and add in the others at a later stage. The end result of AGGFORM will still be a single tape with all input sections and all aggregates in order on it. The procedure is spelled out in what follows; it has not been tested.

a) Process the available input sections through DATAREAD and AGGFØRM1 exactly as described in this mannual for normal data. Continue (if desired) with executions of AGGFØRM2, again exactly as spelled out before, making any aggregates which do not involve the as yet missing input sections.

b) Whenever the new input sections are ready, they should be run through DATAREAD separately (that is, without the previous input.) This new DATAREAD output is then fed into AGGFØRM by a special execution of AGGFORM1. The only difference between this execution of AGGFØRM1 and the first one is that an extra input tape is used in this execution, namely the tape containing the output of the last AGGFØRM (1 or 2) execution made with the first (incomplete) set of input sections. This tape, call it INEXTRA, with tape number UVWX say, should be assigned as unit 12:

```
@ASG,T INEXTRA,8C,UVWXN
@USE 12,INEXTRA
```

These cards should appear before the @XQT P.AGGFORM1 card. The new input sections are fed in as usual for an execution of AGGFØRM1. (That is, they are the equivalent of PTDATA in example F.1, or PFDATA in example F.3 in Appendix F). It is important to note that new aggregates formed by this execution of AGGFØRM1 can only involve the new input sections. AGGFØRM1 does not have the capability of forming new aggregates from any sections or aggregates on the old aggregate tape (unit 12, above). The output tape from this run of AGGFØRM1 (on unit 11) will contain the new input sections and any new aggregates made from them during the execution, merged with the old input sections and aggregates from unit 12. The order of sections and aggregate on the output tape is the standard AGGFORM order - input sections are first, in the order in which they were read in (putting the new input sections at the end of the single section block); then the aggregates appear, in order of aggregate number.

It is important to realize that new input may be added at any point in the series of AGGFORM executions, subject to the restrictions stated above as to forming new aggregates during such an execution. Once this has been done, one then continues with further executions of AGGFØRM2 to make additional aggregates, including ones that might involve the new input sections and the old ones.

H.5.2 On the reduced type number entry

The concept of reduced type number was introduced after the programming of AGGFORM was complete. It was hence effected in a patchwork fashion. This can never (in theory) cause any error in any AGGFORM execution, but an unwary user of an output tape or a future programming modification might lead to error.

Specifically, in any AGGFORM execution, when the input is read in (whether the DATAREAD section output for AGGFORM1, or the output tape from a previous execution for AGGFORM2) the program reads the type number for each entry and sets the reduced type number accordingly. (This is done by the FORTRAN function-call MOD(IABS(N),10) where N is the type number.)

This is done before any testing is done by SELECT, so that tests set up to look at the reduced type number will work. During creation of aggregates, however, the type number may be changed; but the program does not at such a time change the reduced type number correspondingly. For instance, all input sections are internally set as complete descriptions (type number 4) when first read in. But when during an execution an aggregate is made and assigned as a complete description, the type number of each of its component sections is altered from 4 to 2. The reduced type number would (erroneously) be left at 4! Thus the output tape of any execution of AGGFORM may have erroneous reduced type numbers, but all type numbers will be correct.

Anyone who wishes to use output tapes for his own purpose, and also make use of the reduced type number, must hence either

a) First "correct" the tape by rewriting all reduced type numbers as determined from the correct type numbers. Then proceed to use the reduced type number. OR

b) Only use the type number; or

c) Read the type number, but then prior to any test, compute a valid reduced type number by use of MOD(IABS(N),10) to be used as the reduced type number in the test.

H.5.3 On aggregating different questionnaires together!

Within the present philosophy of PATS, where different questionnaires apply to different student populations, it should be obvious that they should not be aggregated together. However AGGFORM does have the capability of aggregating together components having different questionnaires. When components from different questionnaires (possibly having different numbers of questions) are aggregated together, each question number from a given component is aggregated with the same question number for all the other components. Whenever any single component does not have such a question number, no aggregate distribution is made for that question.

If one were to use this facility one would have to arrange that all questionnaires started with the same set of questions, and then branched for questions applicable only to certain populations. One would also have to ignore the computed and printed distributions for those question numbers that arose from what were in fact different questions.

APPENDIX J. POSSIBLE FUTURE IMPROVEMENTS FOR PATS

The reader is also referred to Appendix A3, particularly A3.3.

J.1 Improvements for DATAREAD

J.1.1 The problem of identifying the number of abstainers. As discussed in section 4.4 (p.), the program DATAREAD is presently deficient in that it does not directly identify data sets which correspond to abstaining students. Correspondingly both INITPRT and AGGFORM contain algorithms to estimate this number, and "correct" the printouts and section records.

Clearly a more satisfactory procedure would be created if the program DATAREAD were suitably modified.

J.1.2 The printout of the data sets (cf. Appendix D.2.9, p. D.4). It might be preferable for this to show the contents of each Digitek card exactly as read, with the columns which are considered as "true" data being specially marked. Recall that at present only the contents of the data columns are shown, these columns being specified in the data control cards (cf. section 4.1).

J.2 Improvements for the AGGFORM Computing Ability

J.2.1 The ability to combine two "sections" to form one section. As discussed in section 3.8C (p. 3.16) [also section 5.4, p. 5.6] there can be certain cases where one section is in fact subdivided into subsections with different ID code numbers, and where the input data is usefully originally presented in terms of these subsections. The current example is "advanced lab" - Phys 429 (undergraduate) and Physics 621 (graduate), which actually meet together as one real teaching section. For such cases, a useful feature would be the ability to aggregate the initial (sub-)sections into one section. [This is to be distinguished from the situation where one makes a combination aggregate that counts as a simple section, cf. section 5.1.d, p. 5.2.]

J.2.2 Automatic non-computing of an aggregate if it contains only two component sections. One of the major chores of implementing PATS each semester is the construction of the hierarchical tree and the corresponding control cards for AGGFORM. And yet what one wants to achieve does not vary from semester to semester.

At least as regards faculty, where the problem of individual complete descriptions does not arise, one would like a permanent hierarchical tree and control cards. (A few special cases could be handled separately, by allowing for perhaps 4 such special aggregates per execution.) This cannot be done at present since quite justifiably PATS as a general rule (with exceptions) does not form aggregates which have less than three individual component sections. In the Fall semester, there are perhaps 5 sections of

Phys 181 and 2 of Phys 182; in the Spring semester these numbers change to perhaps 2 sections of Phys 181 and 4 of Phys 182.

The solution is straightforward conceptually--and probably also fairly straightforward to program (but care would be required to follow through all implications within the program). It is to add an automatic reject feature to prevent the creation of a specified aggregate, when an automatic test on the number of ab initio to-be-included sections finds this number to be less than some overall preset cutoff value (probably taken as 3). Naturally one must be able to override this rejection by an appropriate instruction for an individual aggregate. Such a force accept and compute feature would be needed to enable one to compute aggregates containing less thay (say) 3 sections, e.g. for the (General) Physical Sciences sequence. Also this automatic reject should not apply to "combinations", nor to subsection-section aggregates (see immediately above, section J.2.1).

With such an automatic reject feature, one would always set up control cards for aggregates for both Phys 181 and for Phys 182 (as well as for Phys 181 + 182), etc. Thus the main part of the control card deck would not change from semester to semester, and this would greatly simplify the implementation of AGGFORM.

Unfortunately this feature would not be so useful for teaching assistants. For them, by far the largest number of aggregates are complete description aggregates for each named T/A. This matter is discussed immediately below.

J.2.3 Automatic computation of all complete descriptions. We mention this simply to point out that it is probably a pipedream--and furthermore not even that useful. For recall that T/As are often involved in special team teaching arrangements, that they sometimes have two half-assignments, and that frequently they lead both lab and recitation sections. The reason this is likely to be a pipedream is that AGGFORM is performed in a series of executions, and each execution can contain no more than twenty aggregation operations.

J.2.4 Capability to specify and/or alter the number of copies of each aggregate which are to appear in multiplemania after having computed the aggregates. One would then be able to form the new "revised" multiplemania in a final execution which created no new aggregates. (cf Table 5.1 #3, p. 5.5). This would be useful if one found one needed more copies of only some complete hierarchies.

J.3 Improvements in Printout Format, Etc.

1. On the first page of each aggregate printout, where the included components are listed, state the number of responding students in each component.

2. In the same place, print a "warning" signal against each component section for which the participation ratio lies in the marginally acceptable range between cutoffs #1 and #2 (i.e. between "50%" and "70%" participation);

and print a similar warning signal for each component aggregate when appropriate [cf section 5.2g, p. 5.3].

3. In general attempt to reduce the number of printed pages of printout. By removing unnecessary blank lines, one could:

a.) condense a section printout to two pages by putting all the "front matter" (including warning) on the same page as the beginning of the tabulated distribution [Recall that no questionnaire is ever likely to have more than 70*questions!]. Further, one could then remove the 4th blank page in each section printout. Thus for sections one would reduce the amount of paper by a factor of two!

b.) Similarly for aggregates one could attempt to condense the blank lines in the printout. For these it would not be possible to squeeze everything onto two pages, since the listing of included and rejected components would often run over (cf. Appendix E2, p. B2.3 et seq). For this reason it might be best always to start the tabulated distributions at the top of a new page.

J.4 Other Possible Modifications

Further possible changes in AGGFORM are to implement the suggestions made in part I of this report, specifically those discussed in sections 1.4 (p. 1.8) and 1.7 (p. 1.9). The structure of AGGFORM is such that most of these modifications can fairly readily be programmed. However many of them are counter to the present philosophy of the initiators of AGGFORM. PATS is designed to provide an in depth picture of each instructor, together with useful comparison "norms". To get a complete picture requires the presentation of lots of information. Any attempt at condensation, or emphasis on only a few questions, is, we believe, fraught with danger. Even for each question the replacement of,or supplementation of,distribution data by means and standard deviations,is likely to lead to careless use and misuse.

None-the-less, care has been taken in writing the programs to make it as easy as possible to modify them. Thus for instance there is ample space in each record to store means and standard deviations.

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[*] Furthermore, as presently programmed, the upper limit on this number is 80 questions.